FIG. 1

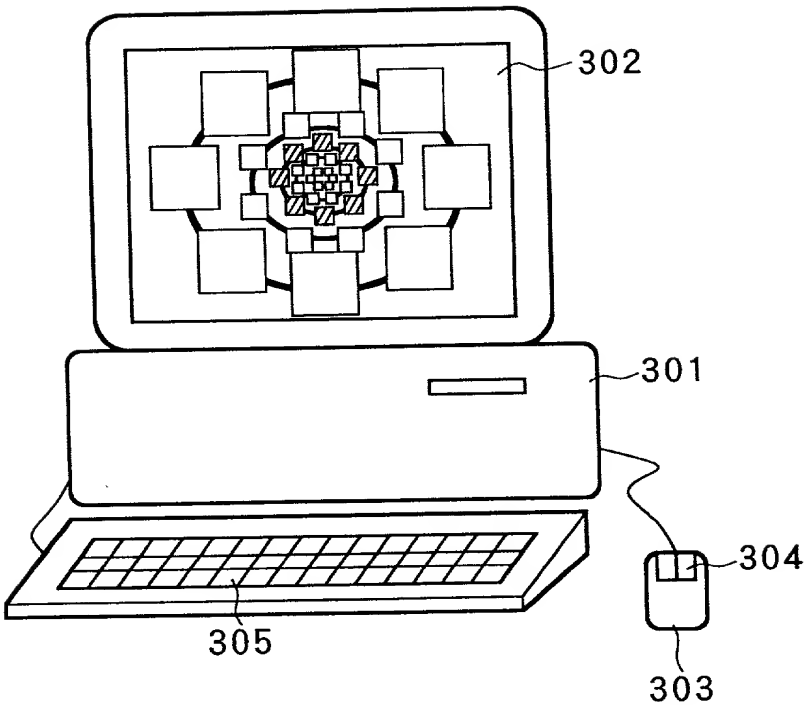


FIG. 2

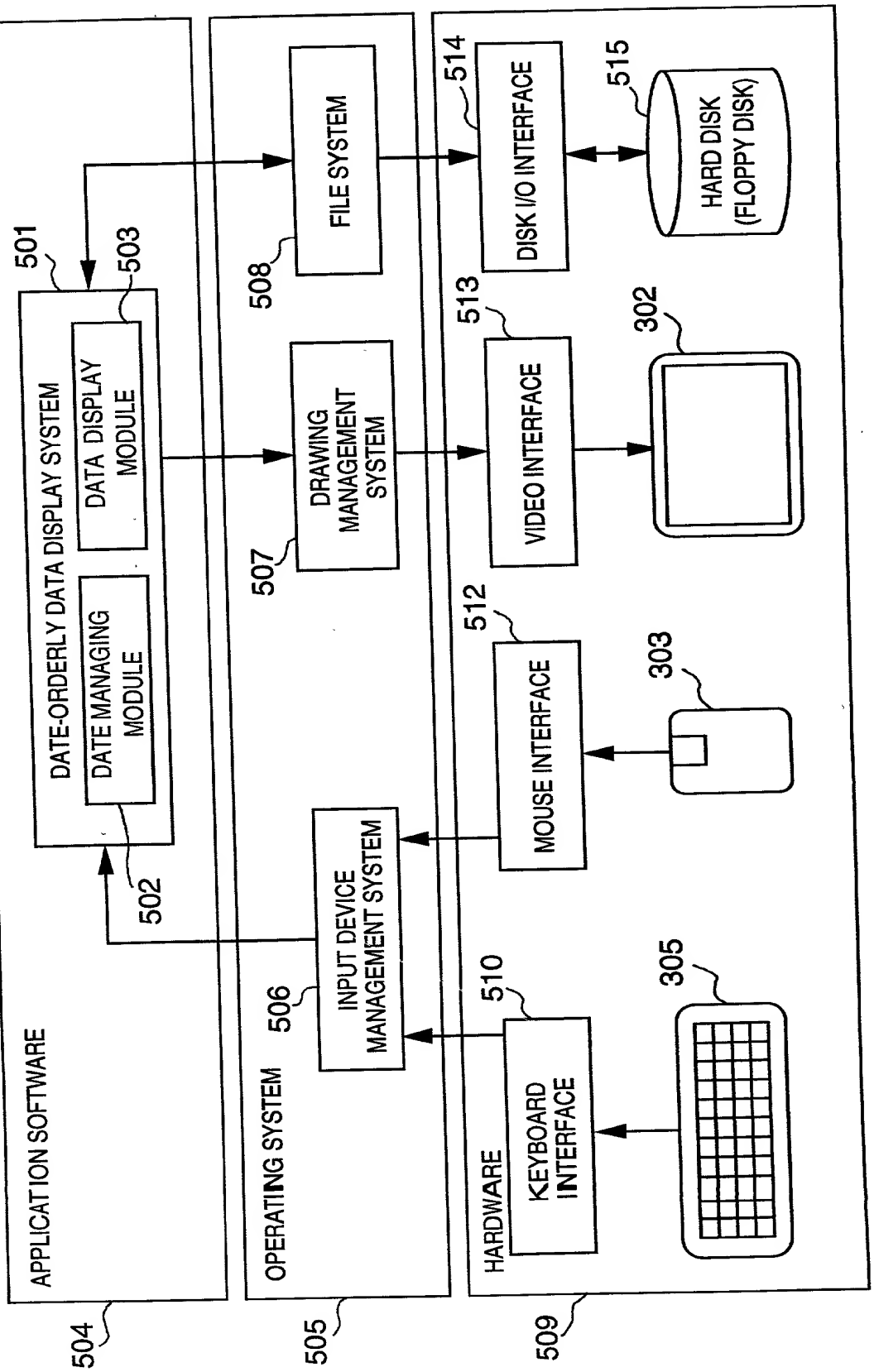

APPLICATION SOFTWARE
504
DATE-ORDERLY DATA DISPLAY SYSTEM
501
DATE MANAGING MODULE
502
DATA DISPLAY MODULE
503
OPERATING SYSTEM
505
INPUT DEVICE MANAGEMENT SYSTEM
506
DRAWING MANAGEMENT SYSTEM
507
FILE SYSTEM
508
HARDWARE
509
KEYBOARD INTERFACE
510
MOUSE INTERFACE
512
VIDEO INTERFACE
513
DISK I/O INTERFACE
514
HARD DISK (FLOPPY DISK)
515
305
303
302

FIG. 3

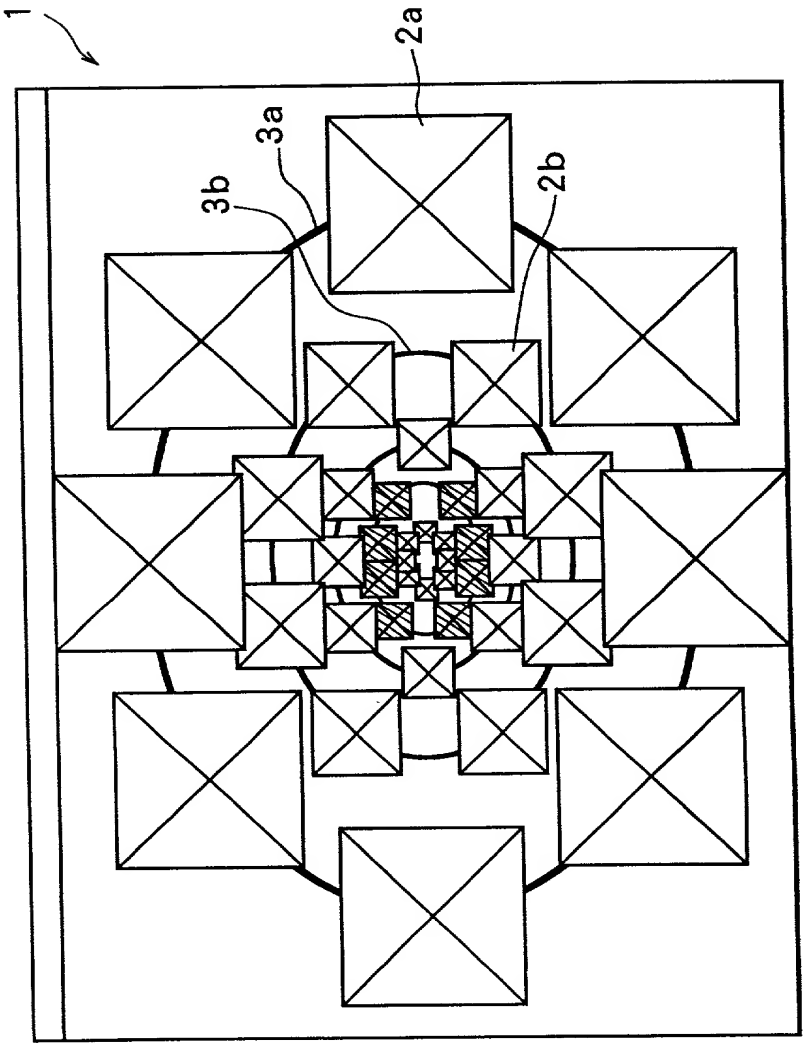


FIG. 4

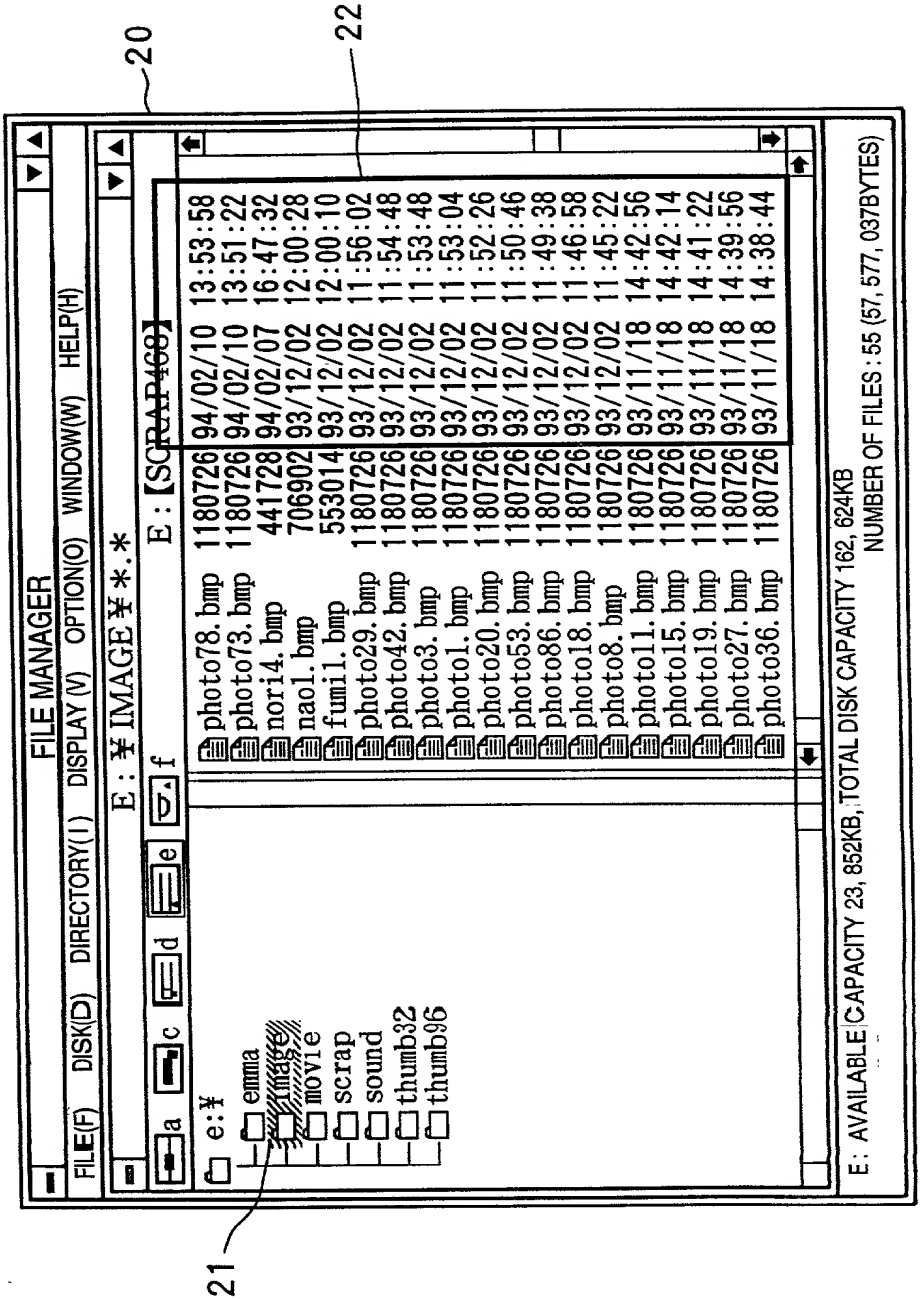

FILE MANAGER
FILE(F) DISK(D) DIRECTORY(I) DISPLAY(V) OPTION(O) WINDOW(W) HELP(H)
E:¥IMAGE¥*.*
E:[SCRAP468]
a c d e f
e:¥
emma
image
movie
scrap
sound
thumb32
thumb96
photo78.bmp 1180726 94/02/10 13:53:58
photo73.bmp 1180726 94/02/10 13:51:22
nori4.bmp 441728 94/02/07 16:47:32
nao1.bmp 706902 93/12/02 12:00:28
fumi1.bmp 553014 93/12/02 12:00:10
photo29.bmp 1180726 93/12/02 11:56:02
photo42.bmp 1180726 93/12/02 11:54:48
photo3.bmp 1180726 93/12/02 11:53:48
photo1.bmp 1180726 93/12/02 11:53:04
photo20.bmp 1180726 93/12/02 11:52:26
photo53.bmp 1180726 93/12/02 11:50:46
photo86.bmp 1180726 93/12/02 11:49:38
photo18.bmp 1180726 93/12/02 11:46:58
photo8.bmp 1180726 93/12/02 11:45:22
photo11.bmp 1180726 93/11/18 14:42:56
photo15.bmp 1180726 93/11/18 14:42:14
photo19.bmp 1180726 93/11/18 14:41:22
photo27.bmp 1180726 93/11/18 14:39:56
photo36.bmp 1180726 93/11/18 14:38:44
E: AVAILABLE CAPACITY 23, 852KB, TOTAL DISK CAPACITY 162, 624KB
NUMBER OF FILES : 55 (57, 577, 037BYTES)
20
21
22

FIG. 5

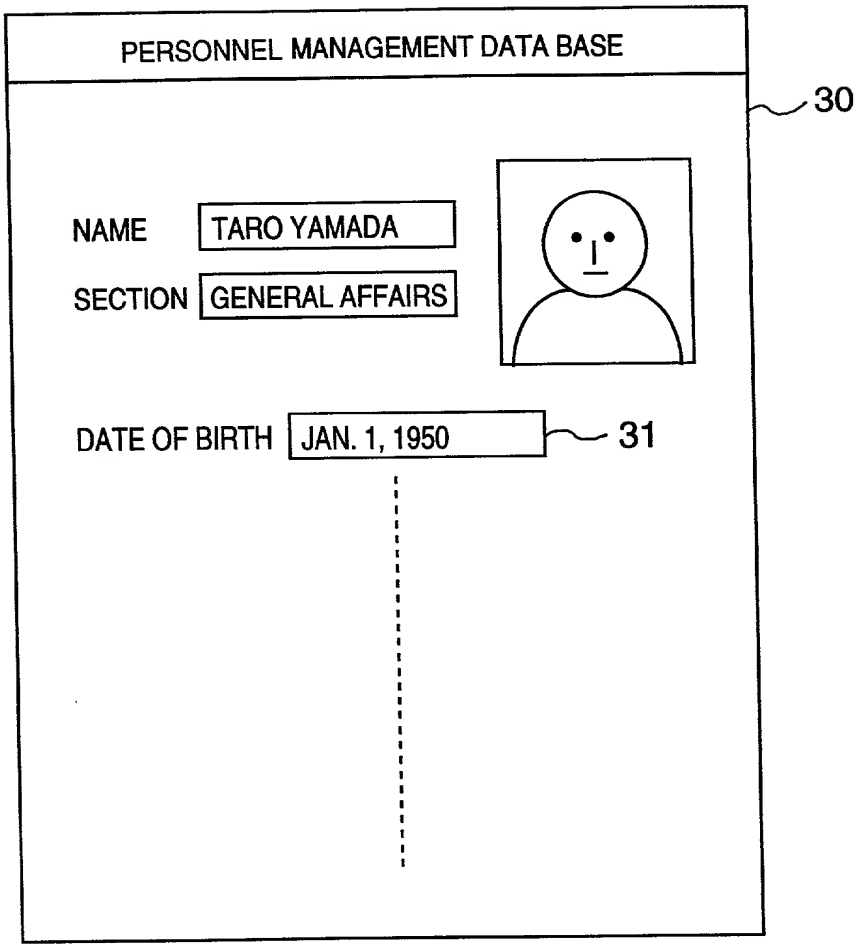

PERSONNEL MANAGEMENT DATA BASE
30
NAME
TARO YAMADA
SECTION
GENERAL AFFAIRS
DATE OF BIRTH
JAN. 1, 1950
31

FIG. 6

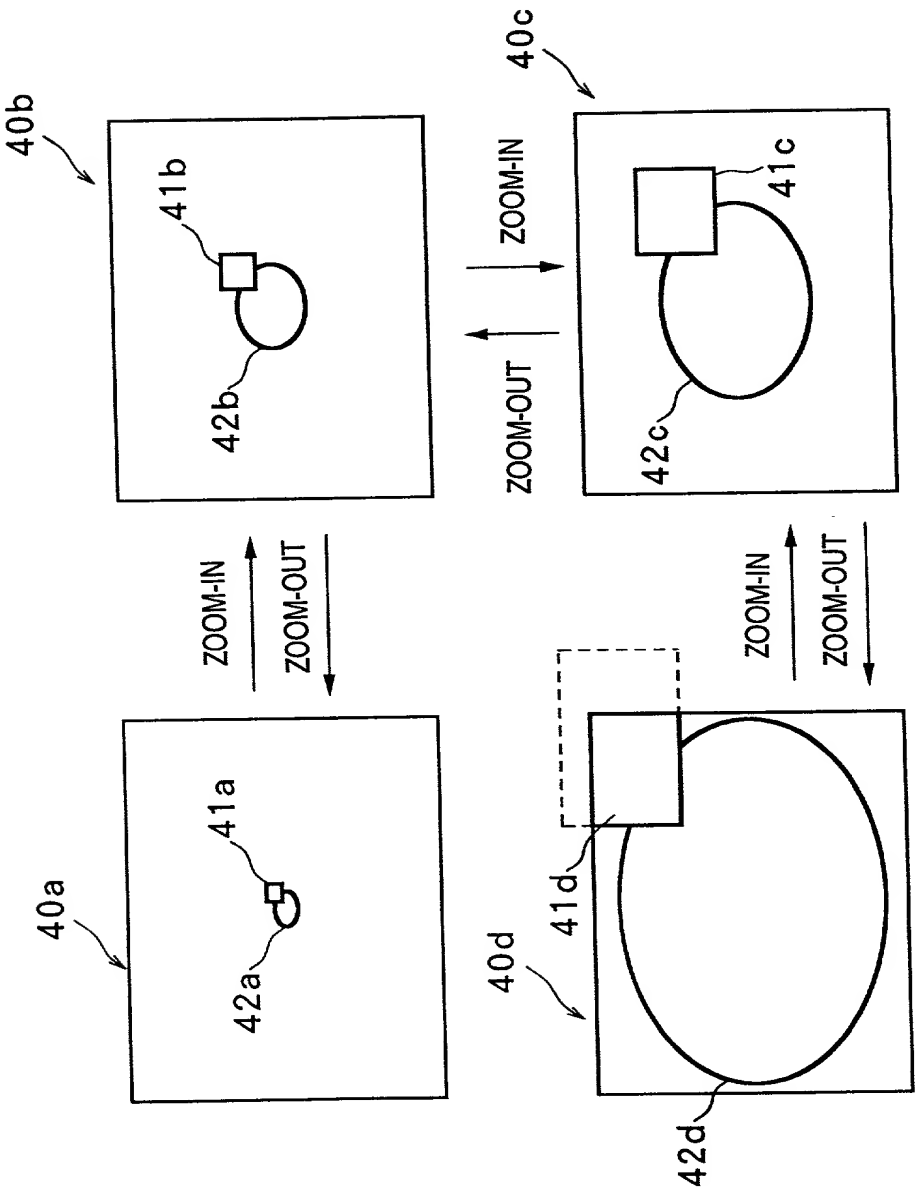

40b
41b
42b
40c
41c
42c
ZOOM-IN
ZOOM-OUT
ZOOM-IN
ZOOM-OUT
40a
41a
42a
40d
41d
42d
ZOOM-IN
ZOOM-OUT

FIG. 7

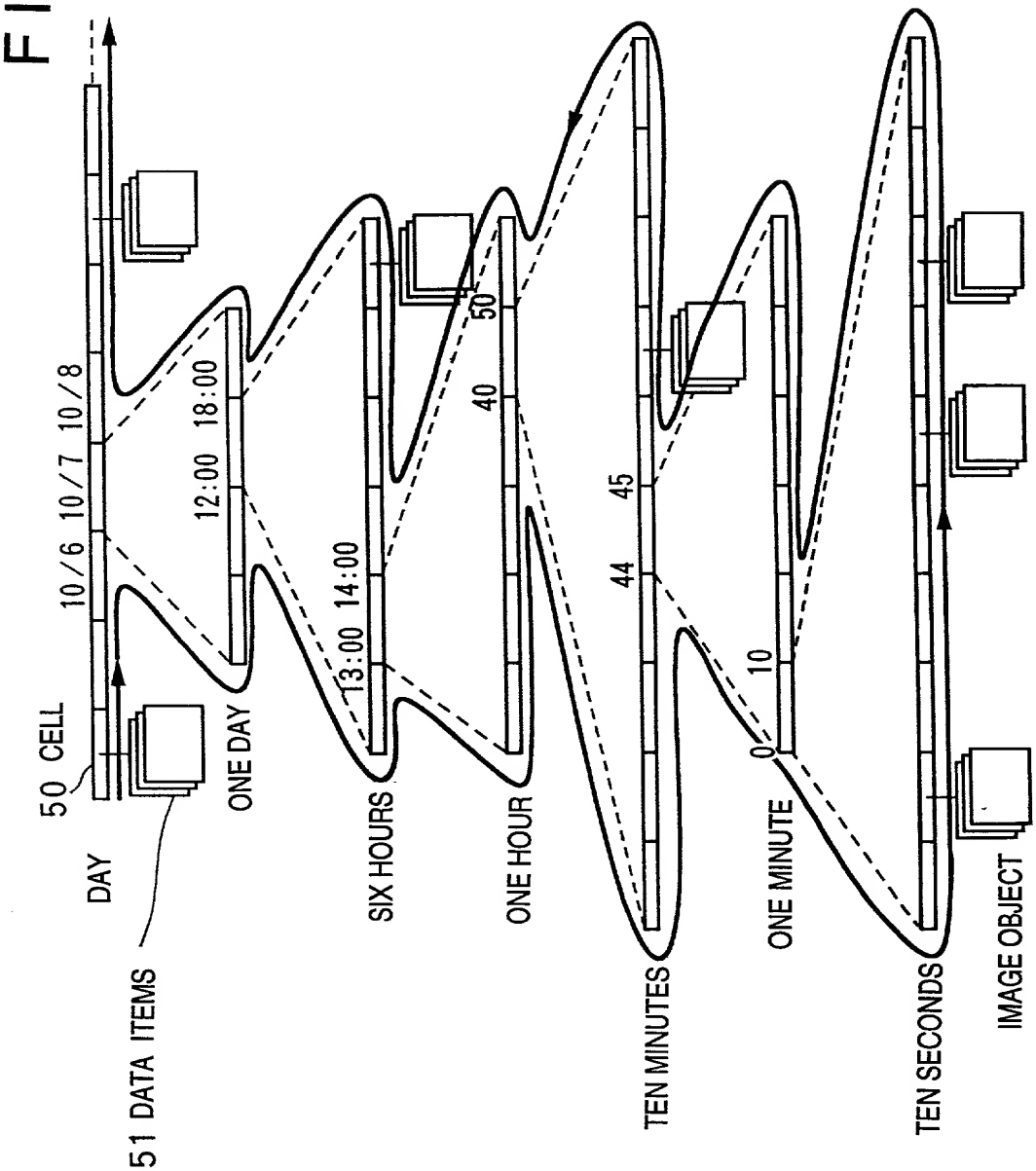

50 CELL
DAY
10/6
10/7
10/8
ONE DAY
12:00
18:00
SIX HOURS
13:00
14:00
ONE HOUR
40
50
TEN MINUTES
44
45
ONE MINUTE
0
10
TEN SECONDS
IMAGE OBJECT
51 DATA ITEMS

FIG. 8

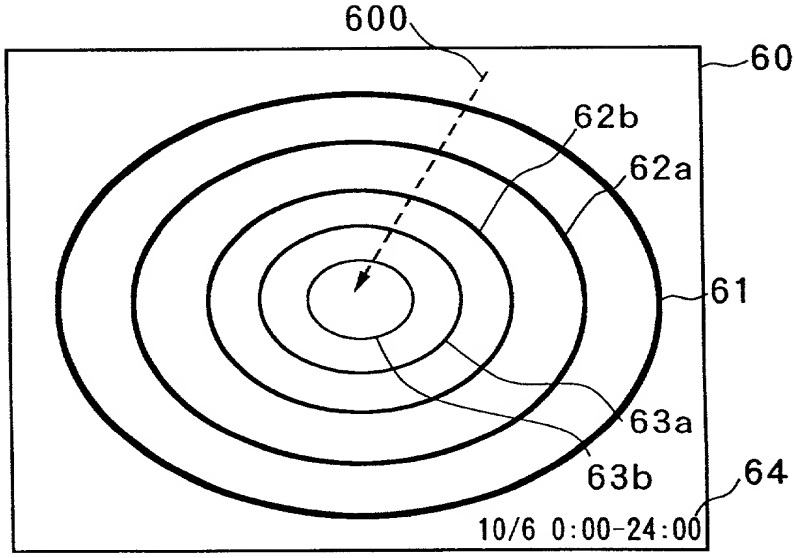
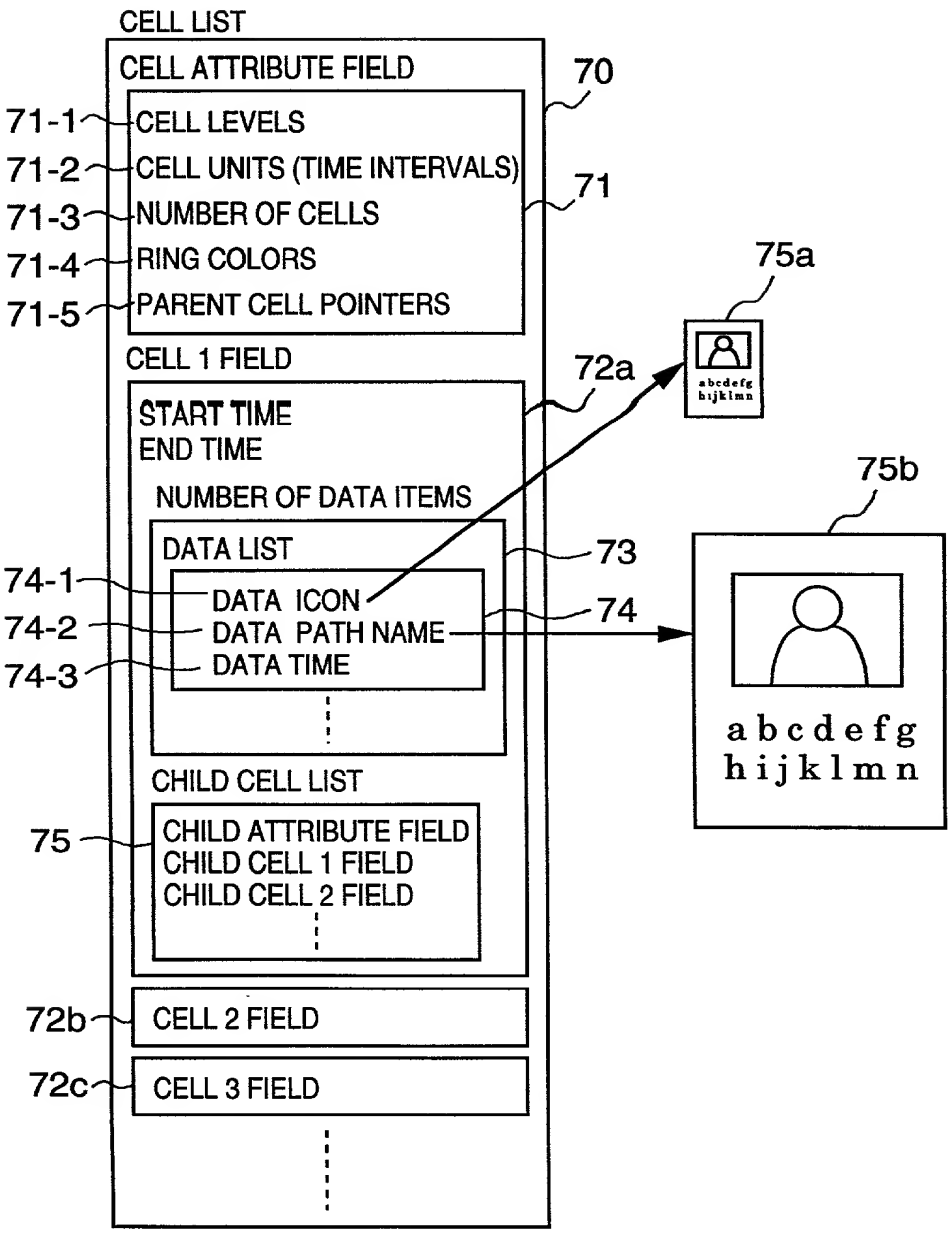


FIG. 9


CELL LIST
CELL ATTRIBUTE FIELD
70
71-1
CELL LEVELS
71-2
CELL UNITS (TIME INTERVALS)
71-3
NUMBER OF CELLS
71
71-4
RING COLORS
71-5
PARENT CELL POINTERS
75a
CELL 1 FIELD
72a
START TIME
END TIME
NUMBER OF DATA ITEMS
75b
DATA LIST
73
74-1
DATA ICON
74-2
DATA PATH NAME
74
74-3
DATA TIME
a b c d e f g
h i j k l m n
CHILD CELL LIST
75
CHILD ATTRIBUTE FIELD
CHILD CELL 1 FIELD
CHILD CELL 2 FIELD
72b
CELL 2 FIELD
72c
CELL 3 FIELD

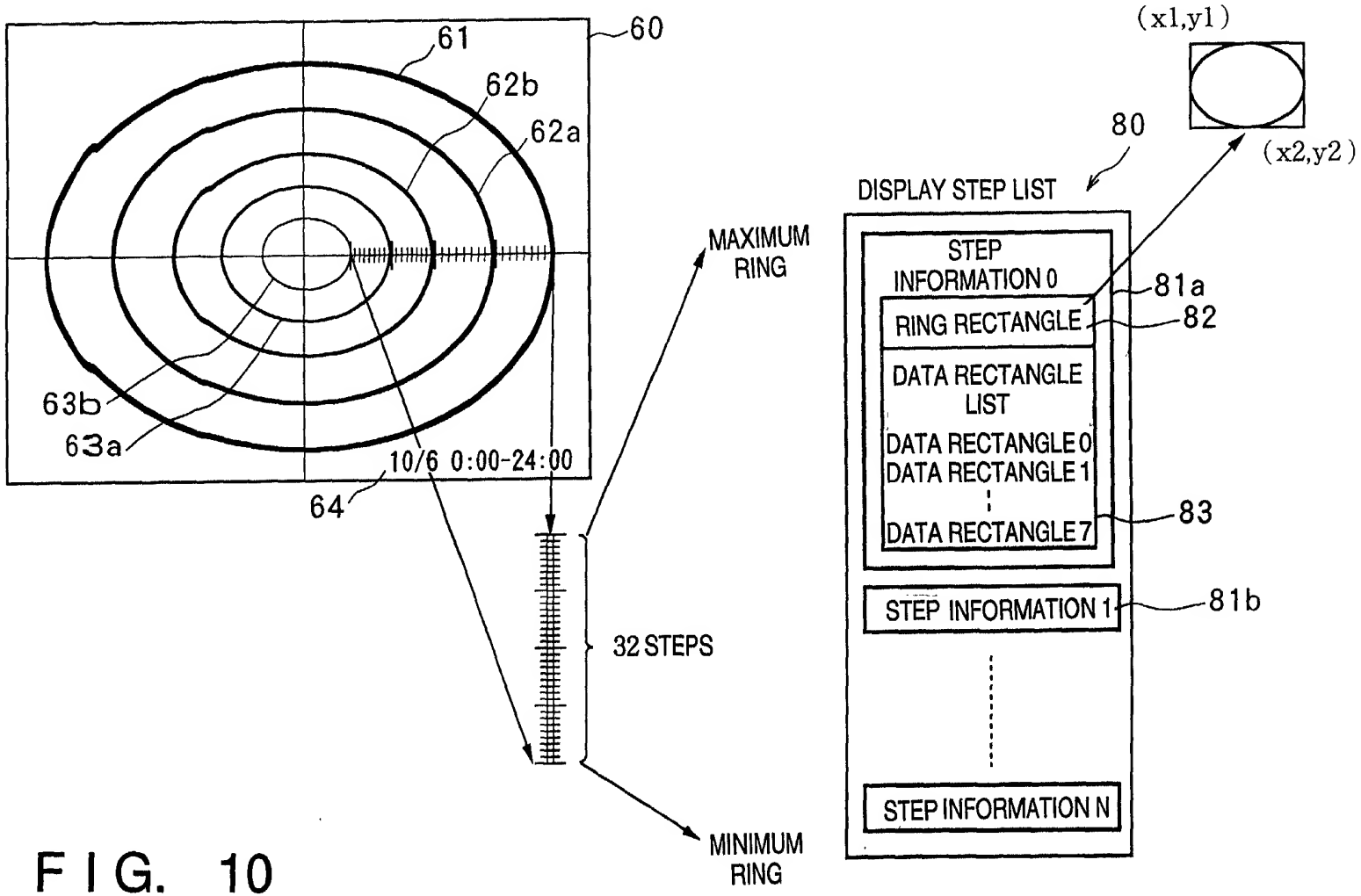

60
61
62b
62a
63b
63a
10/6 0:00-24:00
64
MAXIMUM RING
32 STEPS
MINIMUM RING
(x1,y1)
(x2,y2)
80
DISPLAY STEP LIST
STEP INFORMATION 0
81a
RING RECTANGLE
82
DATA RECTANGLE LIST
DATA RECTANGLE 0
DATA RECTANGLE 1
DATA RECTANGLE 7
83
STEP INFORMATION 1
81b
STEP INFORMATION N

FIG. 10

FIG. 11

ALGORITHM FOR RETRIEVING CELL CORRESPONDING TO OUTMOST RING

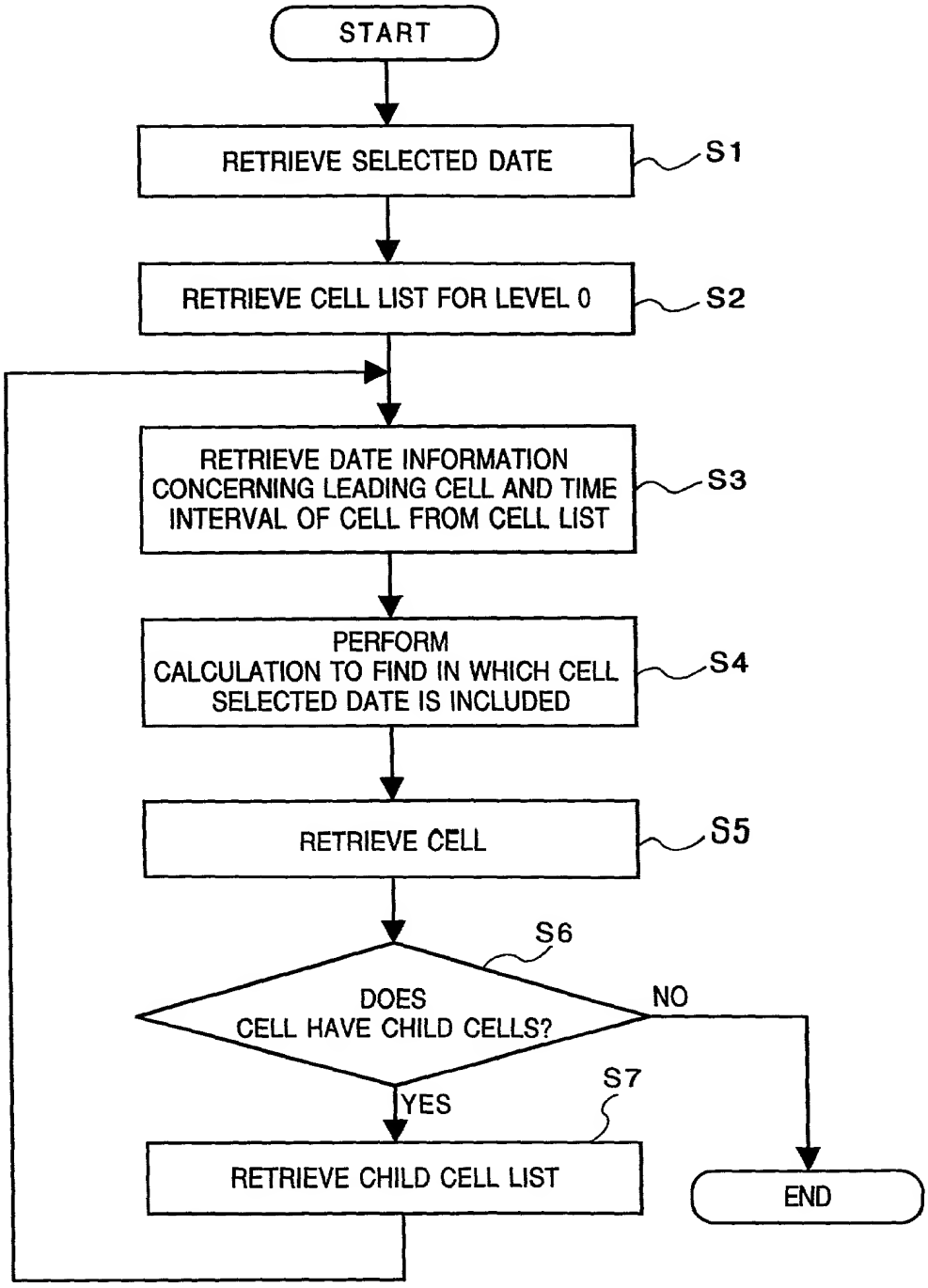


FIG. 12

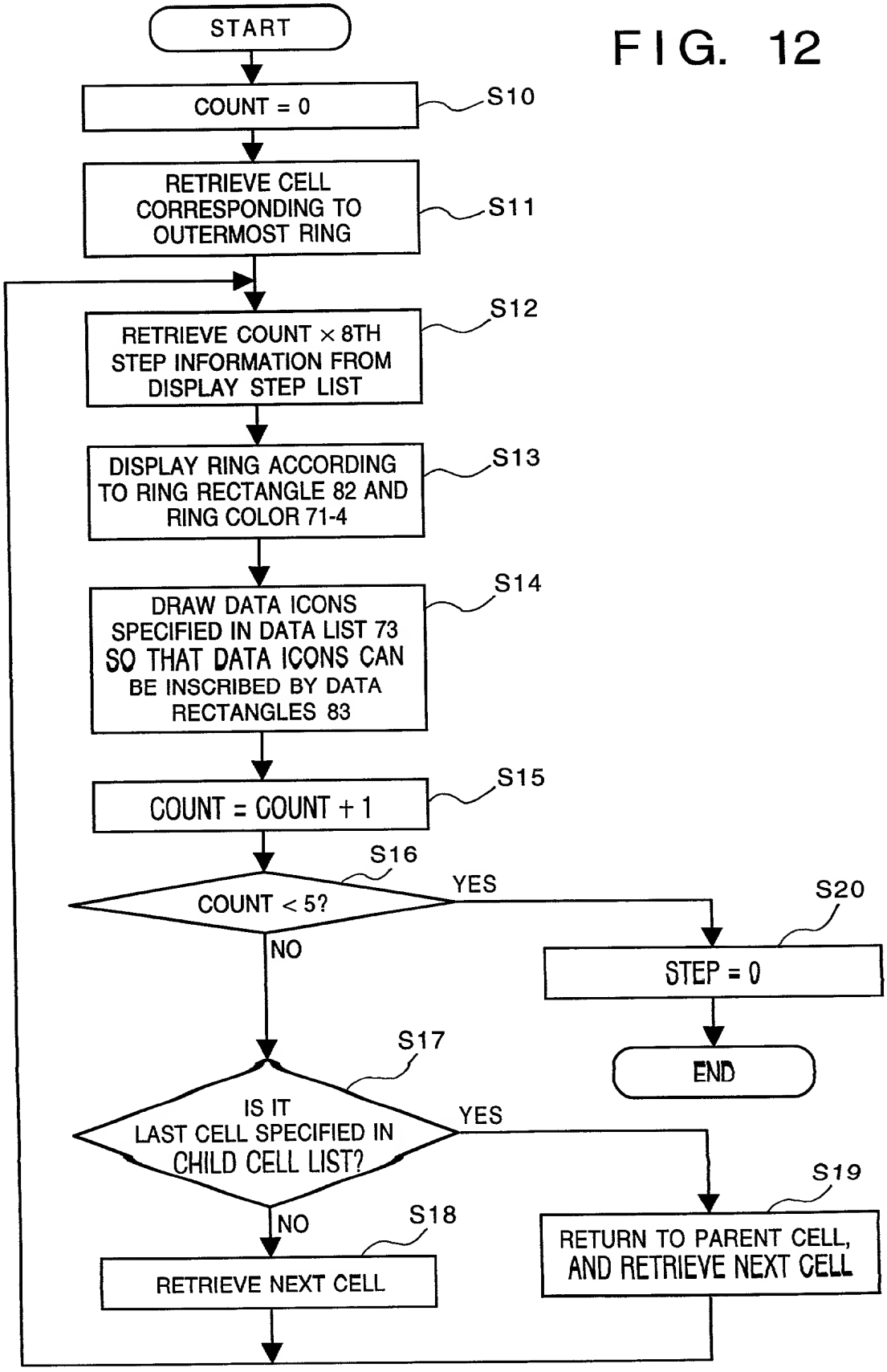

START
COUNT = 0
S10
RETRIEVE CELL CORRESPONDING TO OUTERMOST RING
S11
RETRIEVE COUNT × 8TH STEP INFORMATION FROM DISPLAY STEP LIST
S12
DISPLAY RING ACCORDING TO RING RECTANGLE 82 AND RING COLOR 71-4
S13
DRAW DATA ICONS SPECIFIED IN DATA LIST 73 SO THAT DATA ICONS CAN BE INSCRIBED BY DATA RECTANGLES 83
S14
COUNT = COUNT + 1
S15
S16
COUNT < 5?
YES
NO
S20
STEP = 0
END
S17
IS IT LAST CELL SPECIFIED IN CHILD CELL LIST?
YES
NO
S18
RETRIEVE NEXT CELL
S19
RETURN TO PARENT CELL, AND RETRIEVE NEXT CELL

FIG. 13

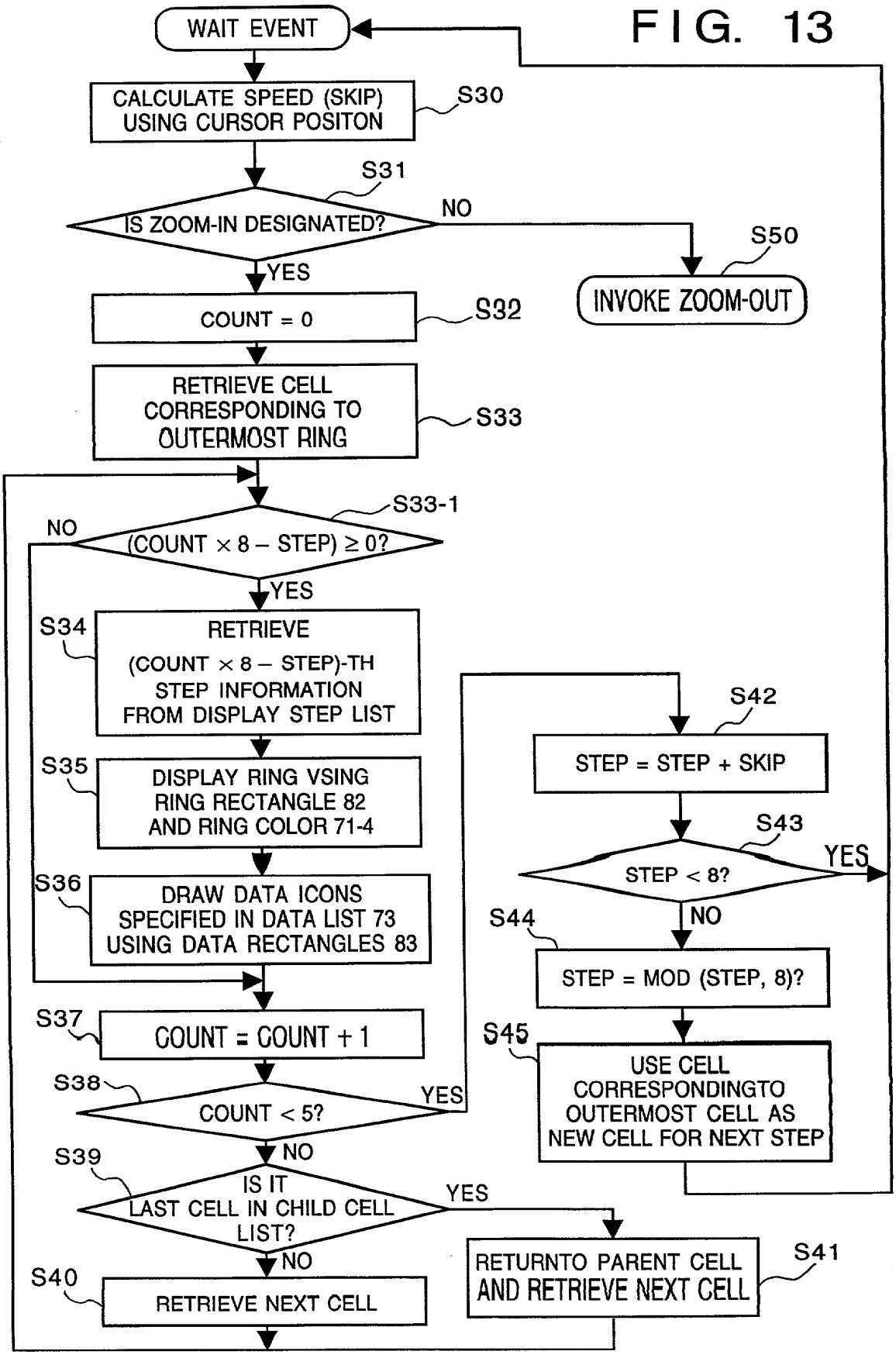

WAIT EVENT
CALCULATE SPEED (SKIP) USING CURSOR POSITON
S30
S31
IS ZOOM-IN DESIGNATED?
NO
S50
INVOKE ZOOM-OUT
YES
COUNT = 0
S32
RETRIEVE CELL CORRESPONDING TO OUTERMOST RING
S33
S33-1
NO
(COUNT × 8 – STEP) ≥ 0?
YES
S34
RETRIEVE (COUNT × 8 – STEP)-TH STEP INFORMATION FROM DISPLAY STEP LIST
S35
DISPLAY RING VSING RING RECTANGLE 82 AND RING COLOR 71-4
S36
DRAW DATA ICONS SPECIFIED IN DATA LIST 73 USING DATA RECTANGLES 83
S37
COUNT = COUNT + 1
S38
COUNT < 5?
YES
NO
S39
IS IT LAST CELL IN CHILD CELL LIST?
YES
NO
S40
RETRIEVE NEXT CELL
RETURNTO PARENT CELL AND RETRIEVE NEXT CELL
S41
S42
STEP = STEP + SKIP
S43
STEP < 8?
YES
NO
S44
STEP = MOD (STEP, 8)?
S45
USE CELL CORRESPONDINGTO OUTERMOST CELL AS NEW CELL FOR NEXT STEP

FIG. 14

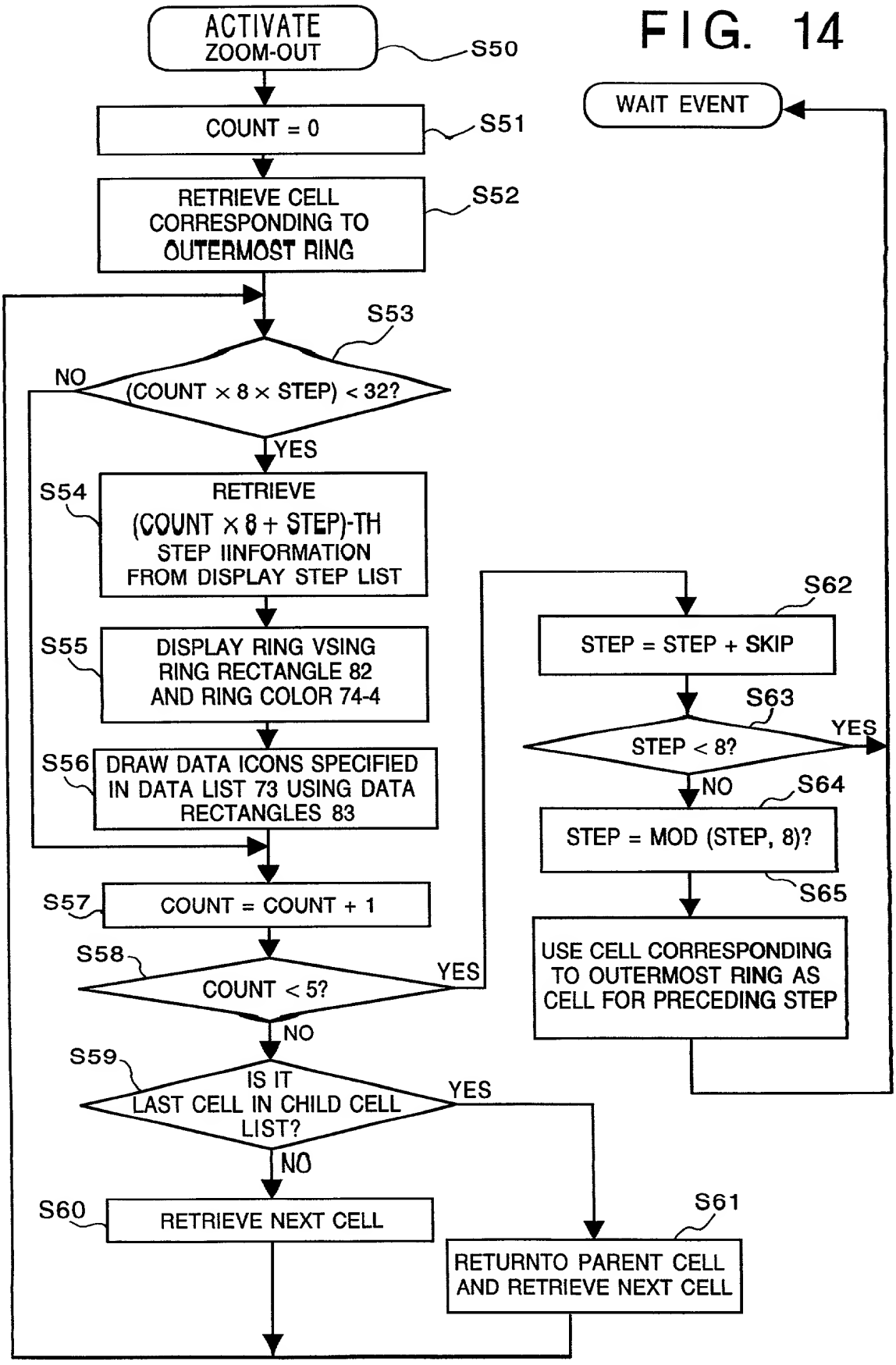

ACTIVATE ZOOM-OUT
S50
COUNT = 0
S51
RETRIEVE CELL CORRESPONDING TO OUTERMOST RING
S52
S53
NO
(COUNT × 8 × STEP) < 32?
YES
S54
RETRIEVE (COUNT × 8 + STEP)-TH STEP IINFORMATION FROM DISPLAY STEP LIST
S55
DISPLAY RING VSING RING RECTANGLE 82 AND RING COLOR 74-4
S56
DRAW DATA ICONS SPECIFIED IN DATA LIST 73 USING DATA RECTANGLES 83
S57
COUNT = COUNT + 1
S58
COUNT < 5?
YES
NO
S59
IS IT LAST CELL IN CHILD CELL LIST?
YES
NO
S60
RETRIEVE NEXT CELL
S61
RETURNTO PARENT CELL AND RETRIEVE NEXT CELL
WAIT EVENT
S62
STEP = STEP + SKIP
S63
STEP < 8?
YES
NO
S64
STEP = MOD (STEP, 8)?
S65
USE CELL CORRESPONDING TO OUTERMOST RING AS CELL FOR PRECEDING STEP

FIG. 15

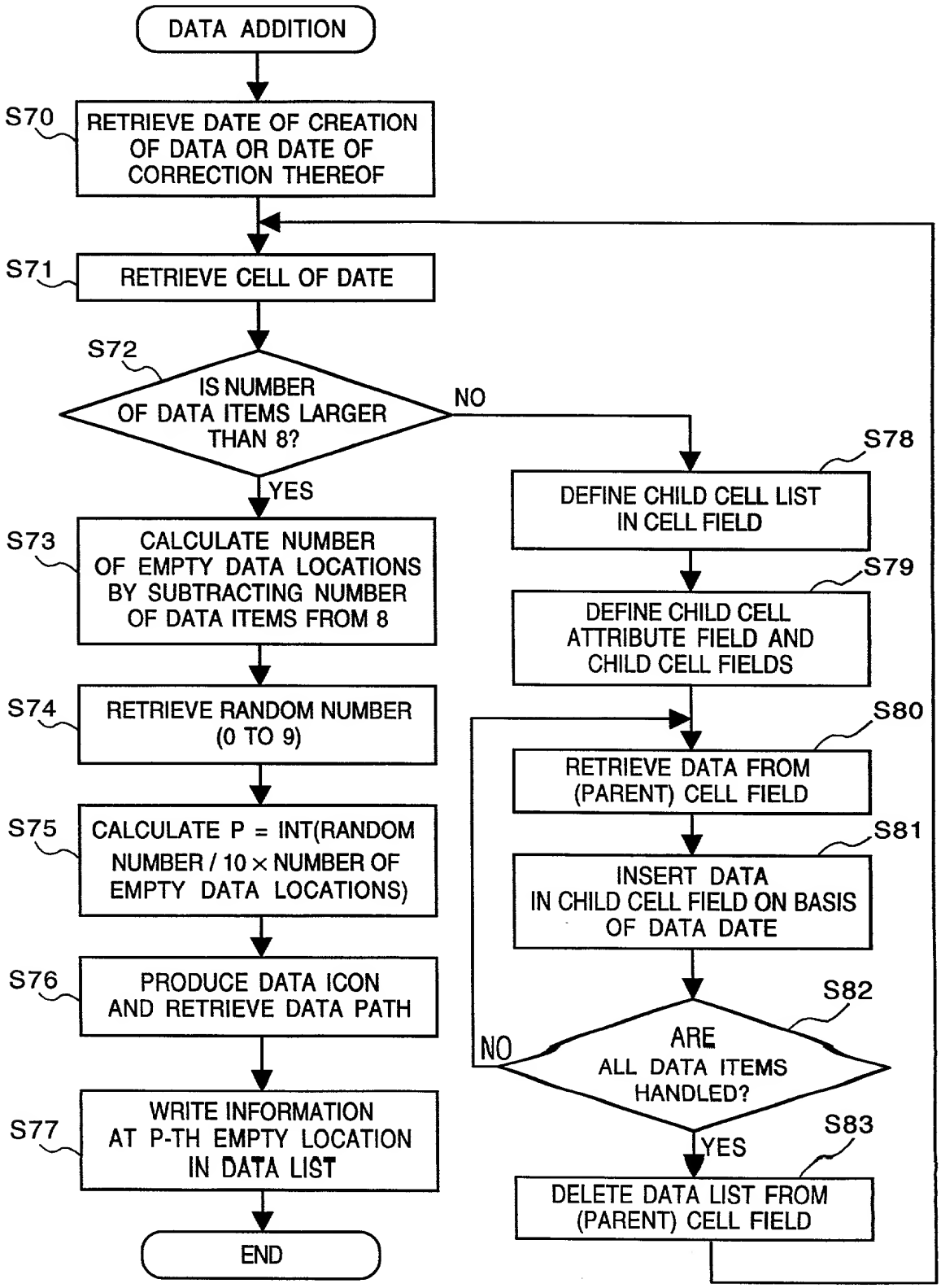

DATA ADDITION
S70
RETRIEVE DATE OF CREATION OF DATA OR DATE OF CORRECTION THEREOF
S71
RETRIEVE CELL OF DATE
S72
IS NUMBER OF DATA ITEMS LARGER THAN 8?
NO
YES
S73
CALCULATE NUMBER OF EMPTY DATA LOCATIONS BY SUBTRACTING NUMBER OF DATA ITEMS FROM 8
S74
RETRIEVE RANDOM NUMBER (0 TO 9)
S75
CALCULATE P = INT(RANDOM NUMBER / 10 × NUMBER OF EMPTY DATA LOCATIONS)
S76
PRODUCE DATA ICON AND RETRIEVE DATA PATH
S77
WRITE INFORMATION AT P-TH EMPTY LOCATION IN DATA LIST
END
S78
DEFINE CHILD CELL LIST IN CELL FIELD
S79
DEFINE CHILD CELL ATTRIBUTE FIELD AND CHILD CELL FIELDS
S80
RETRIEVE DATA FROM (PARENT) CELL FIELD
S81
INSERT DATA IN CHILD CELL FIELD ON BASIS OF DATA DATE
S82
ARE ALL DATA ITEMS HANDLED?
NO
YES
S83
DELETE DATA LIST FROM (PARENT) CELL FIELD

FIG. 16

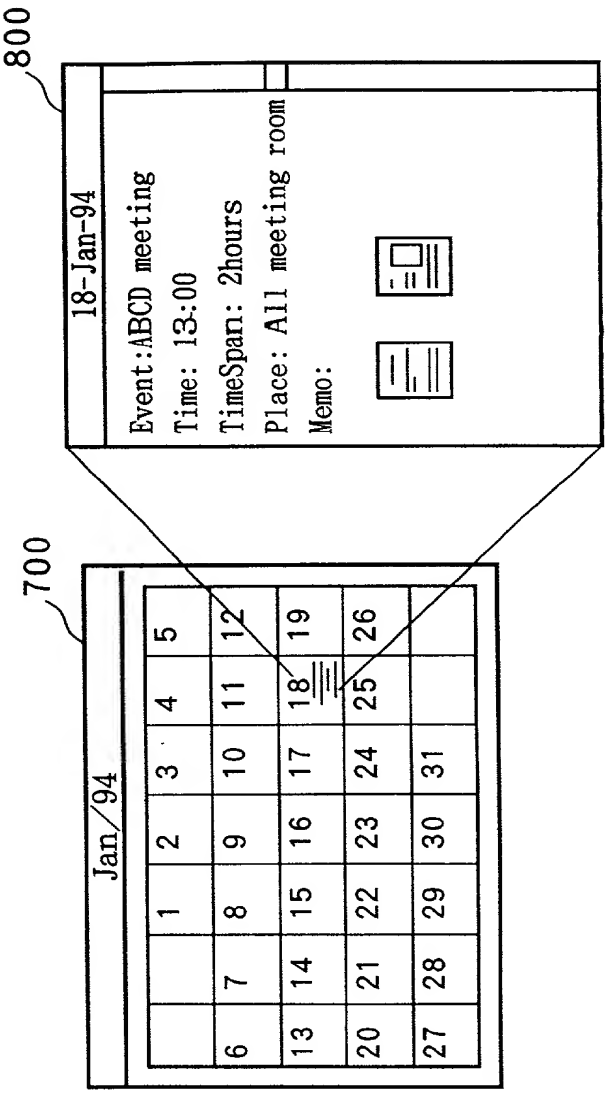

800
18-Jan-94
Event:ABCD meeting
Time: 13:00
TimeSpan: 2hours
Place: All meeting room
Memo:
700
Jan/94
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

FIG. 17

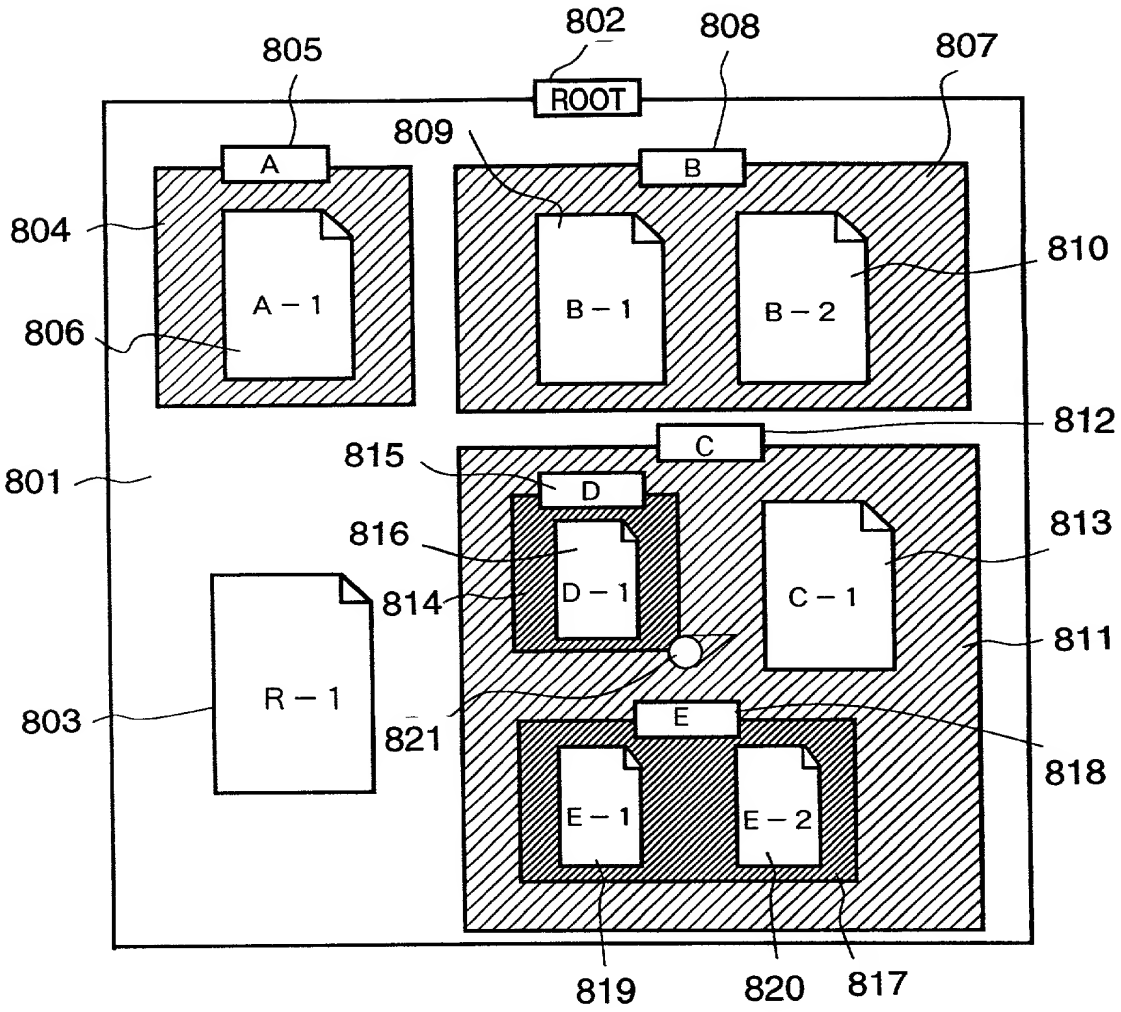

802
808
805
807
ROOT
809
A
B
804
A – 1
B – 1
B – 2
810
806
812
C
815
801
D
813
816
D – 1
C – 1
814
811
R – 1
803
821
E
818
E – 1
E – 2
819
820
817

FIG. 18

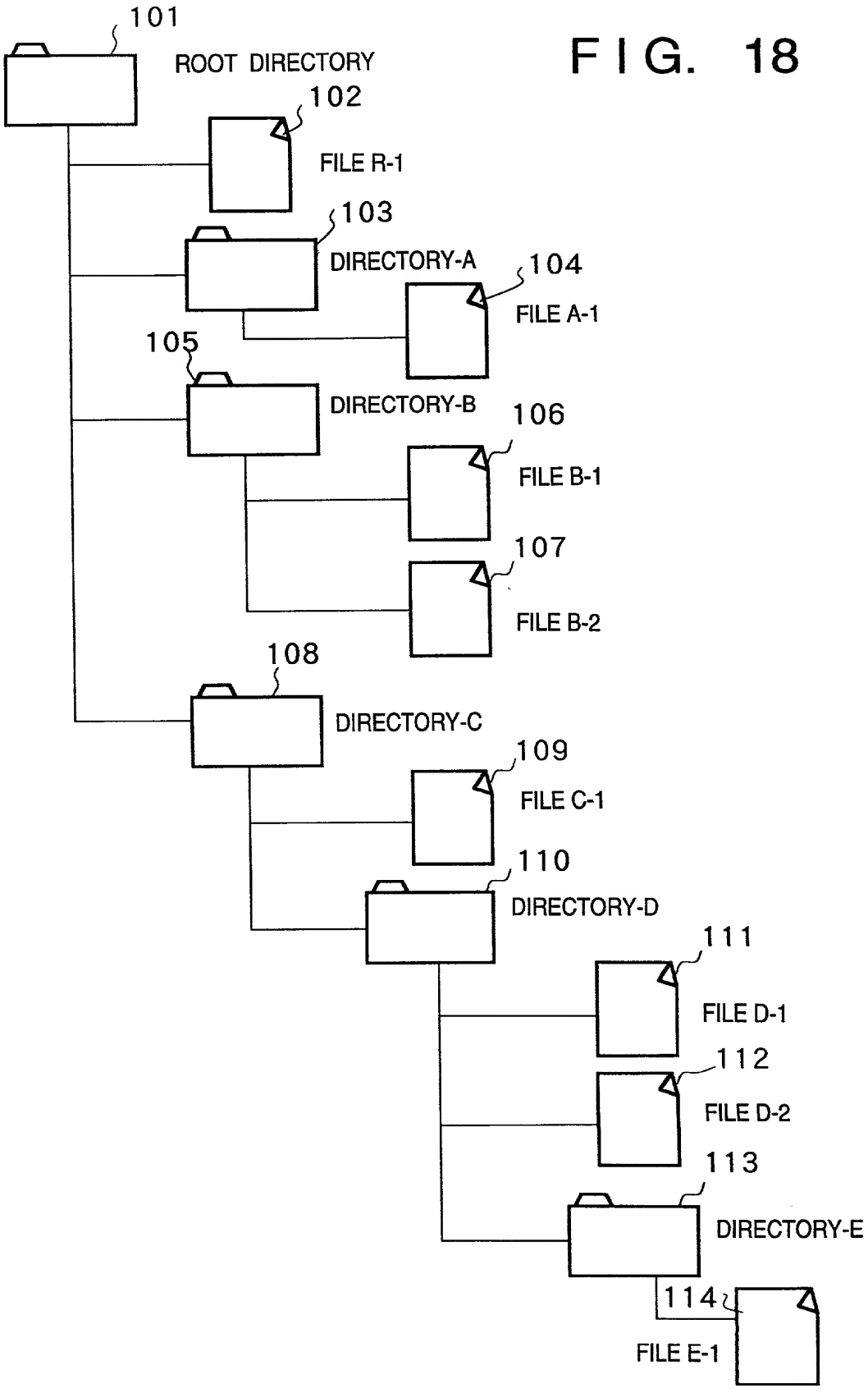

101
ROOT DIRECTORY
102
FILE R-1
103
DIRECTORY-A
104
FILE A-1
105
DIRECTORY-B
106
FILE B-1
107
FILE B-2
108
DIRECTORY-C
109
FILE C-1
110
DIRECTORY-D
111
FILE D-1
112
FILE D-2
113
DIRECTORY-E
114
FILE E-1

FIG. 19A

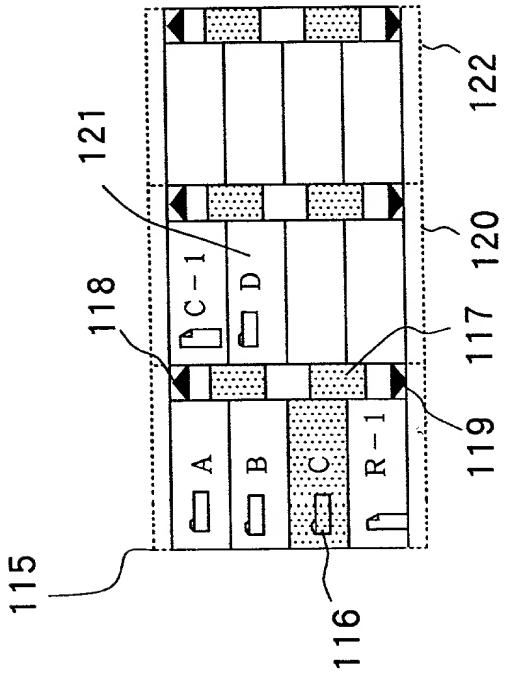


FIG. 19B

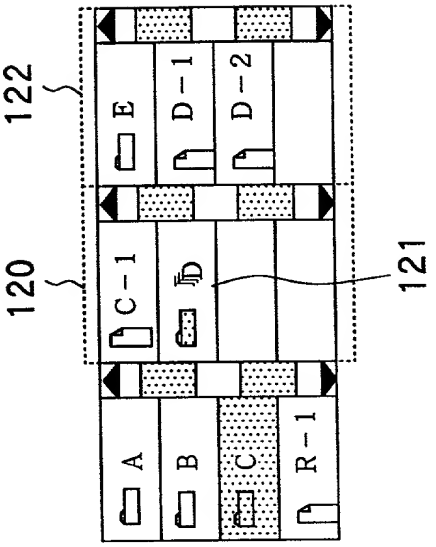


FIG. 20

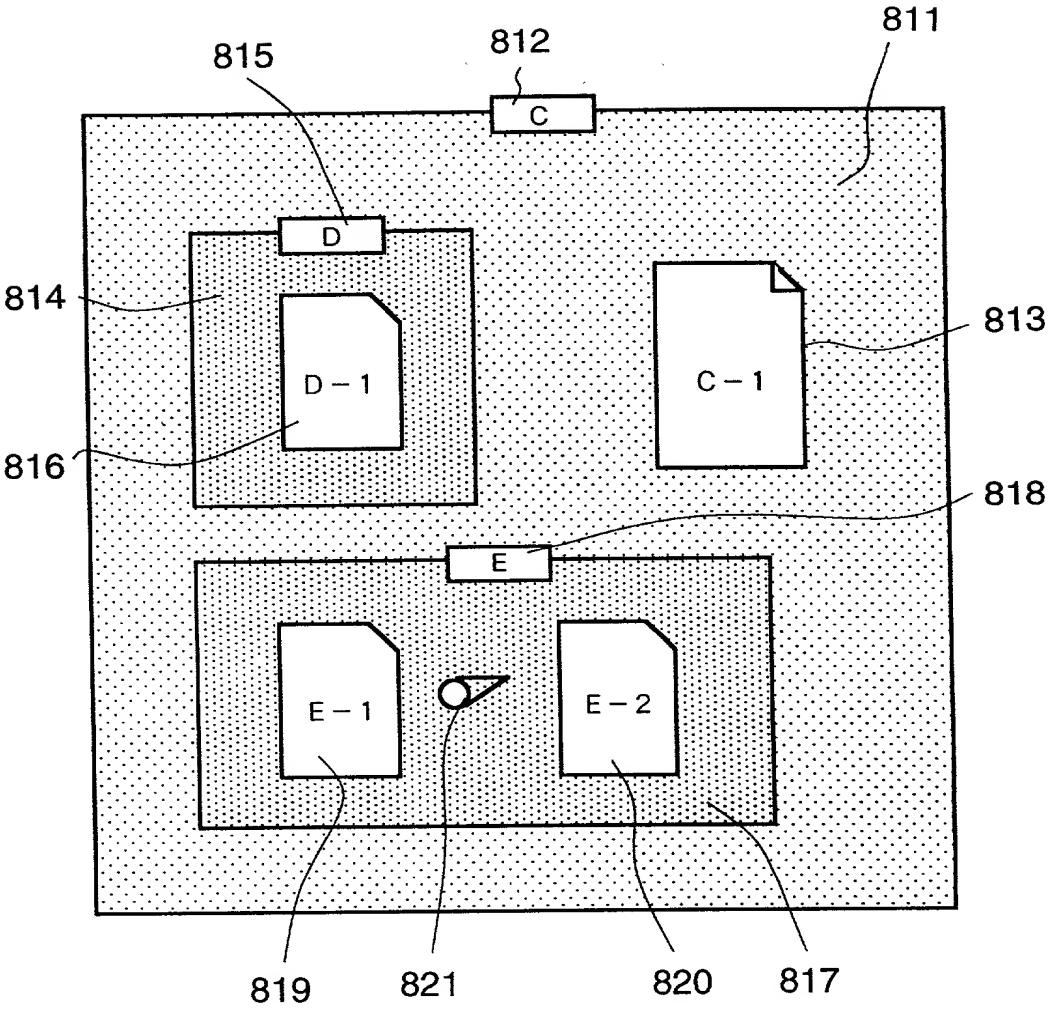


FIG. 21

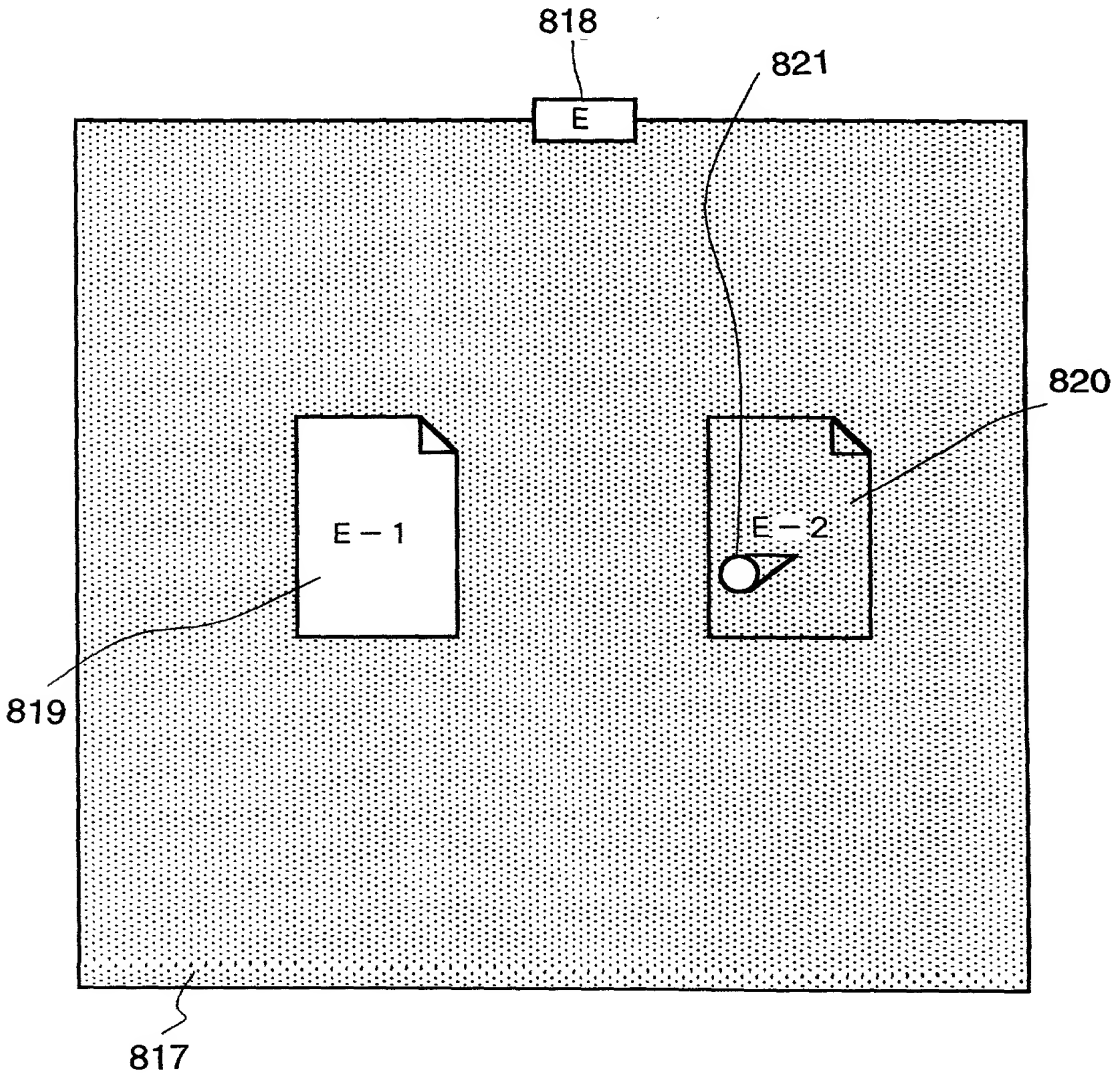


FIG. 22

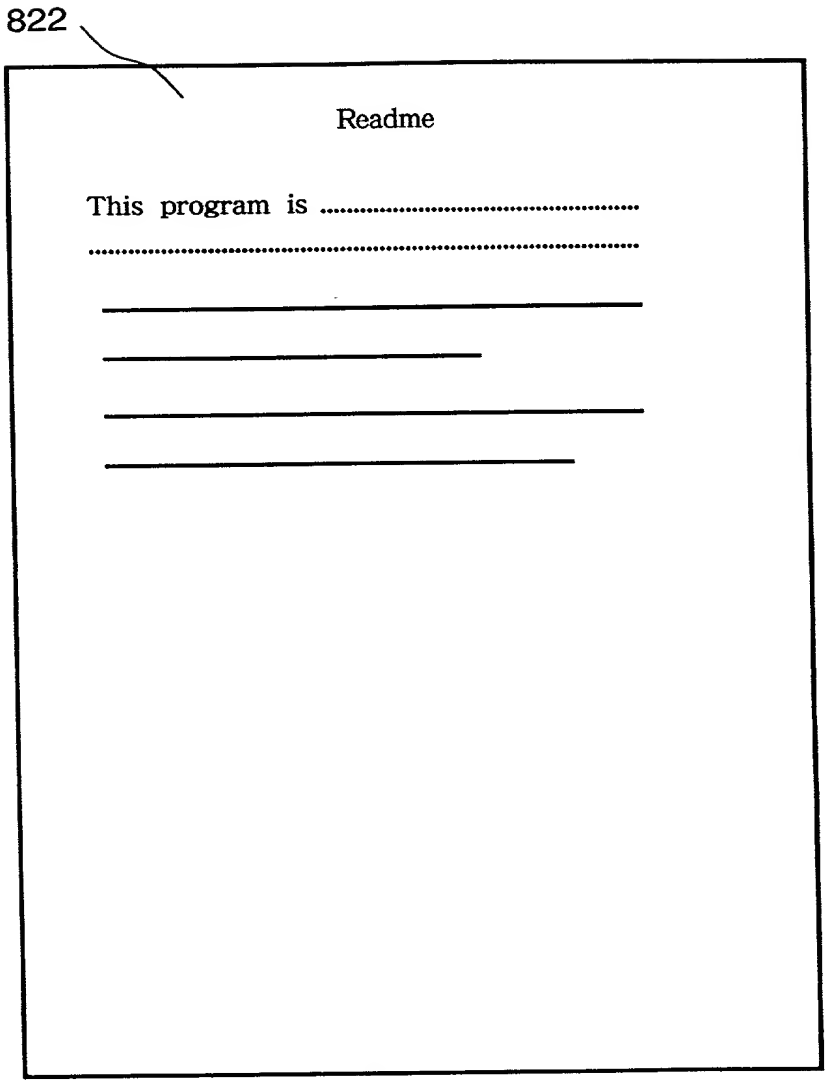


FIG. 23

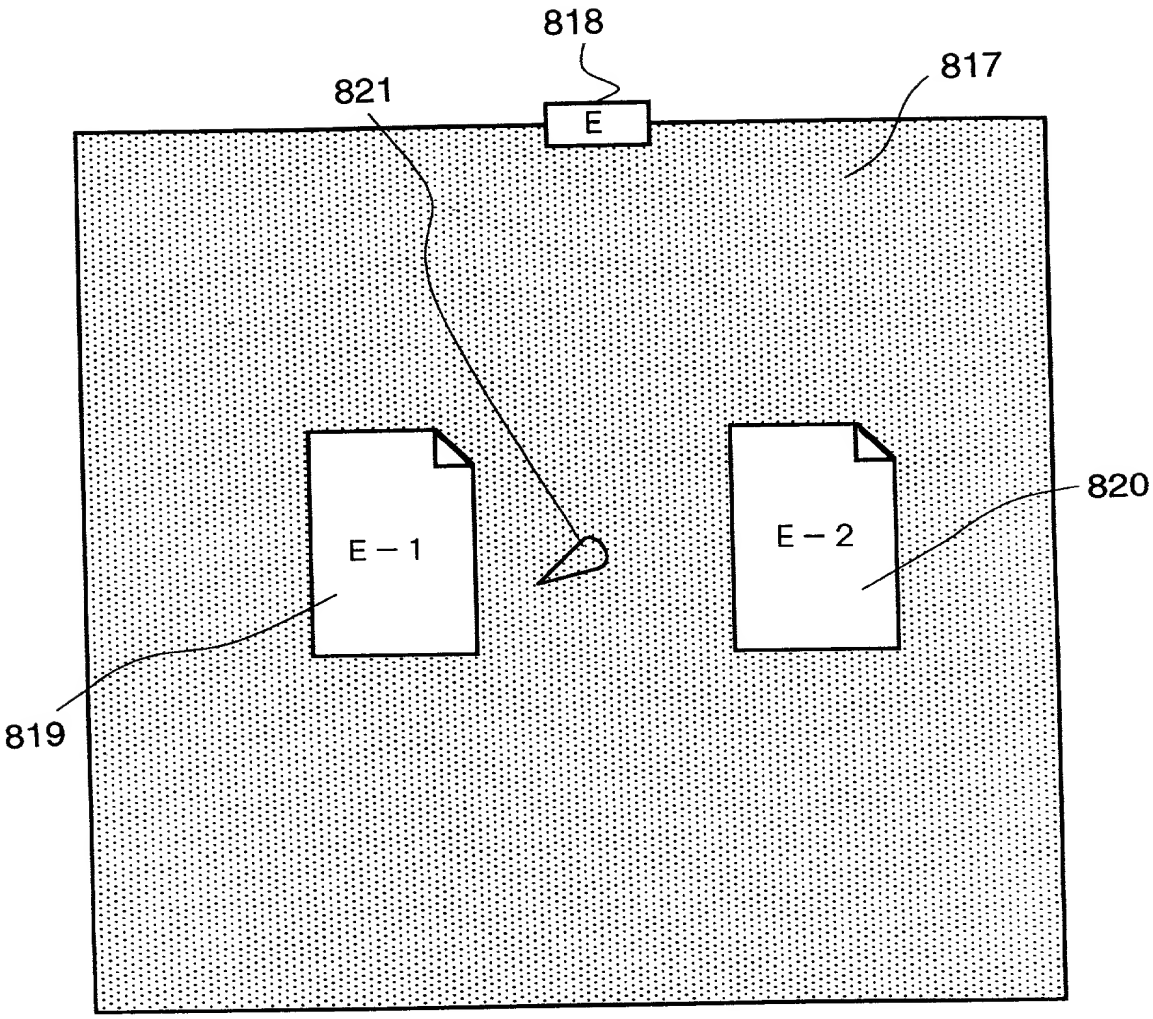


FIG. 24

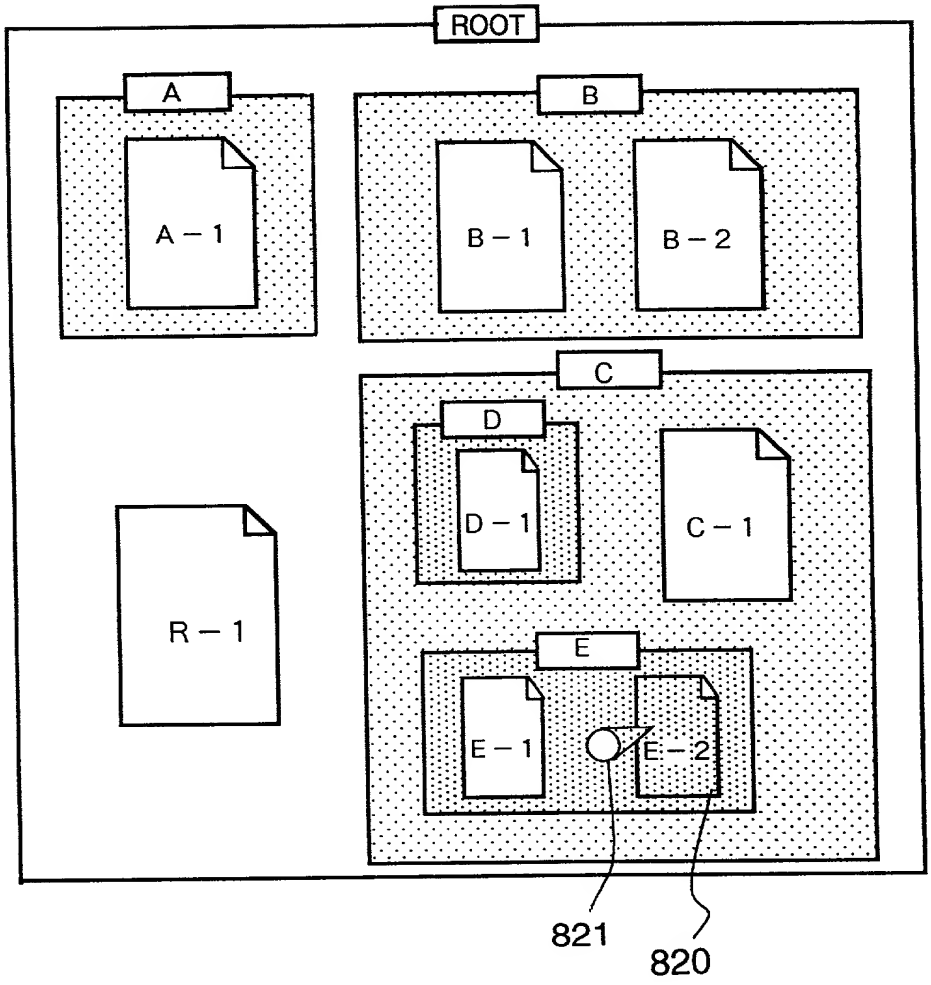


FIG. 25

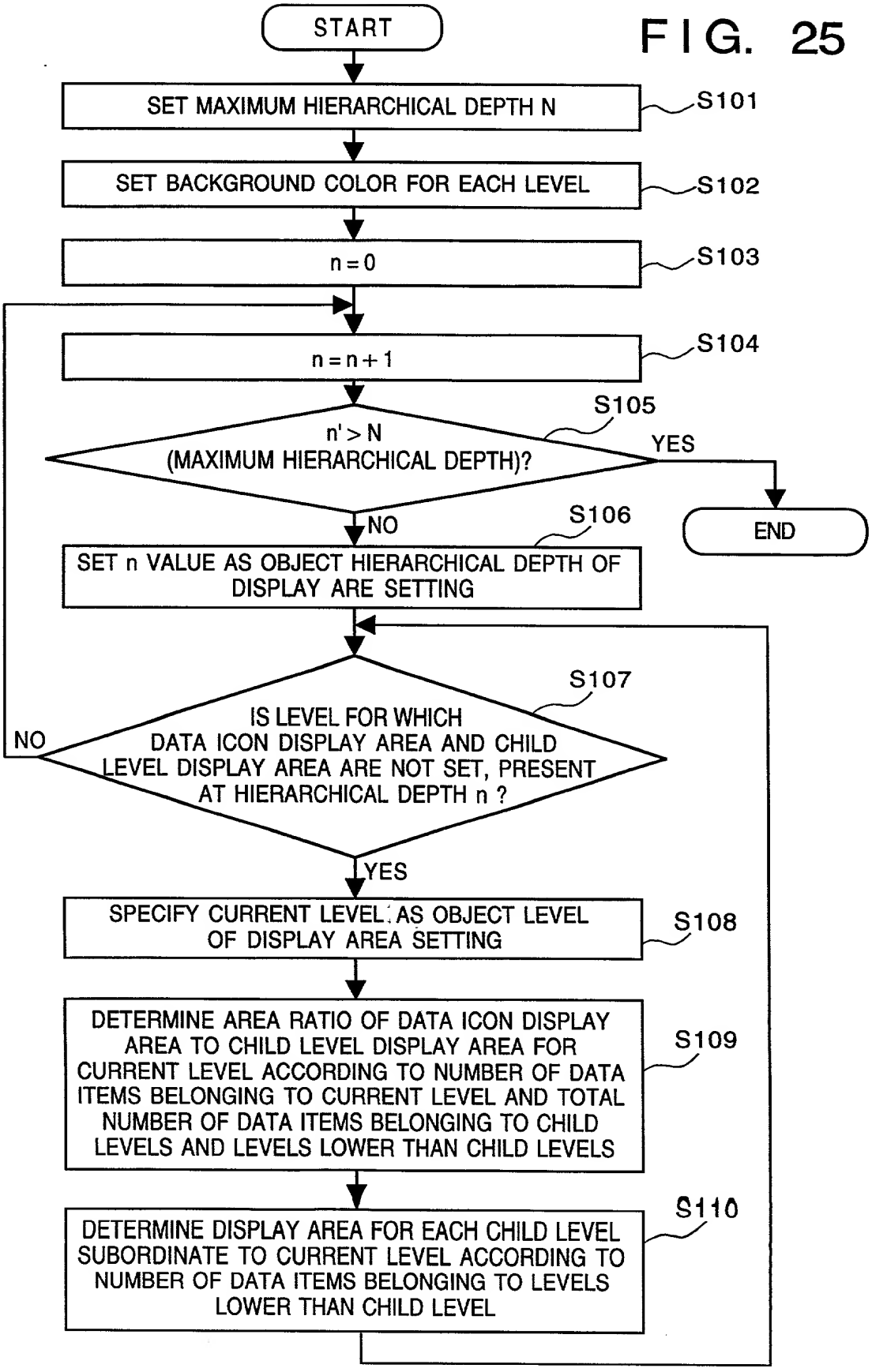

START
SET MAXIMUM HIERARCHICAL DEPTH N
S101
SET BACKGROUND COLOR FOR EACH LEVEL
S102
n = 0
S103
n = n + 1
S104
n' > N
(MAXIMUM HIERARCHICAL DEPTH)?
S105
YES
END
NO
SET n VALUE AS OBJECT HIERARCHICAL DEPTH OF DISPLAY ARE SETTING
S106
IS LEVEL FOR WHICH DATA ICON DISPLAY AREA AND CHILD LEVEL DISPLAY AREA ARE NOT SET, PRESENT AT HIERARCHICAL DEPTH n ?
S107
NO
YES
SPECIFY CURRENT LEVEL AS OBJECT LEVEL OF DISPLAY AREA SETTING
S108
DETERMINE AREA RATIO OF DATA ICON DISPLAY AREA TO CHILD LEVEL DISPLAY AREA FOR CURRENT LEVEL ACCORDING TO NUMBER OF DATA ITEMS BELONGING TO CURRENT LEVEL AND TOTAL NUMBER OF DATA ITEMS BELONGING TO CHILD LEVELS AND LEVELS LOWER THAN CHILD LEVELS
S109
DETERMINE DISPLAY AREA FOR EACH CHILD LEVEL SUBORDINATE TO CURRENT LEVEL ACCORDING TO NUMBER OF DATA ITEMS BELONGING TO LEVELS LOWER THAN CHILD LEVEL
S110

FIG. 26

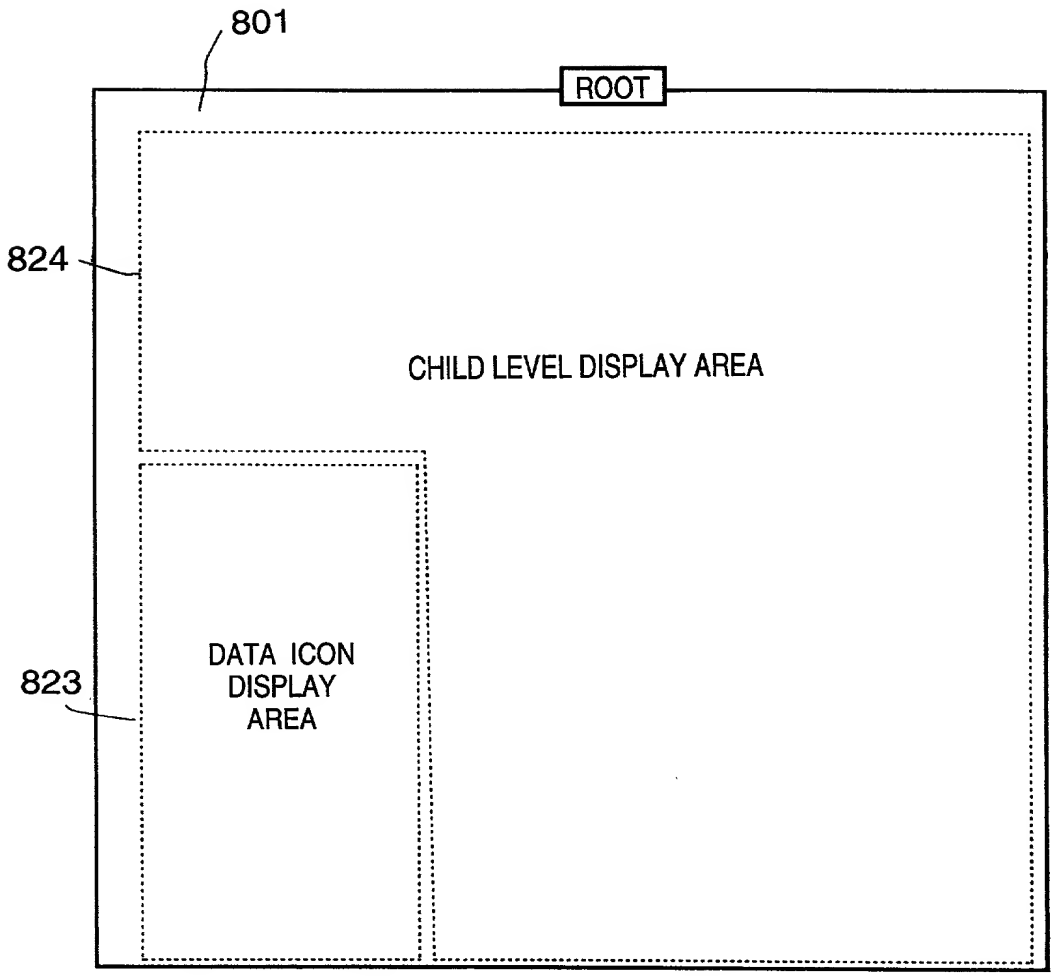

801
ROOT
824
CHILD LEVEL DISPLAY AREA
823
DATA ICON
DISPLAY
AREA

FIG. 27

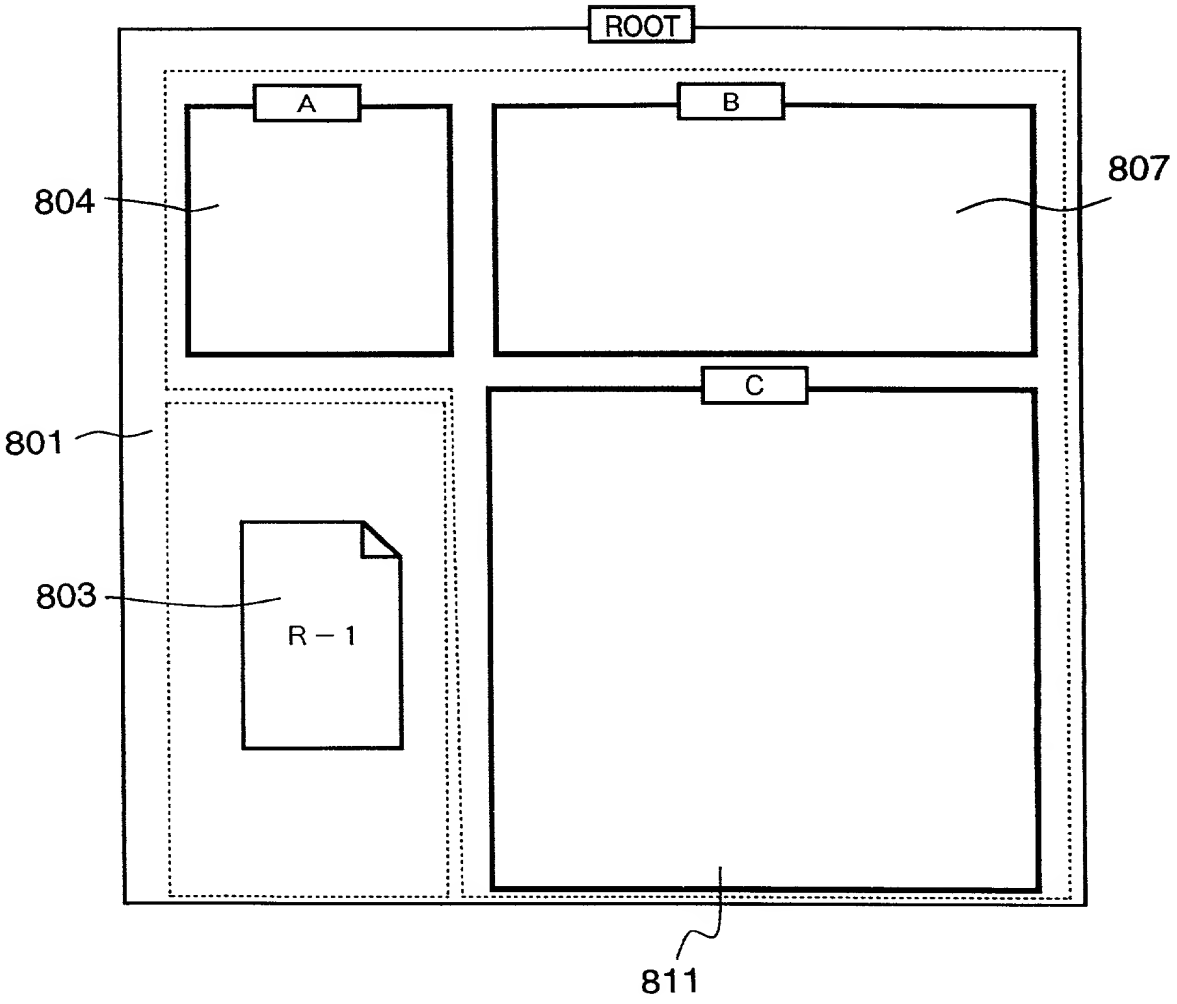


FIG. 28

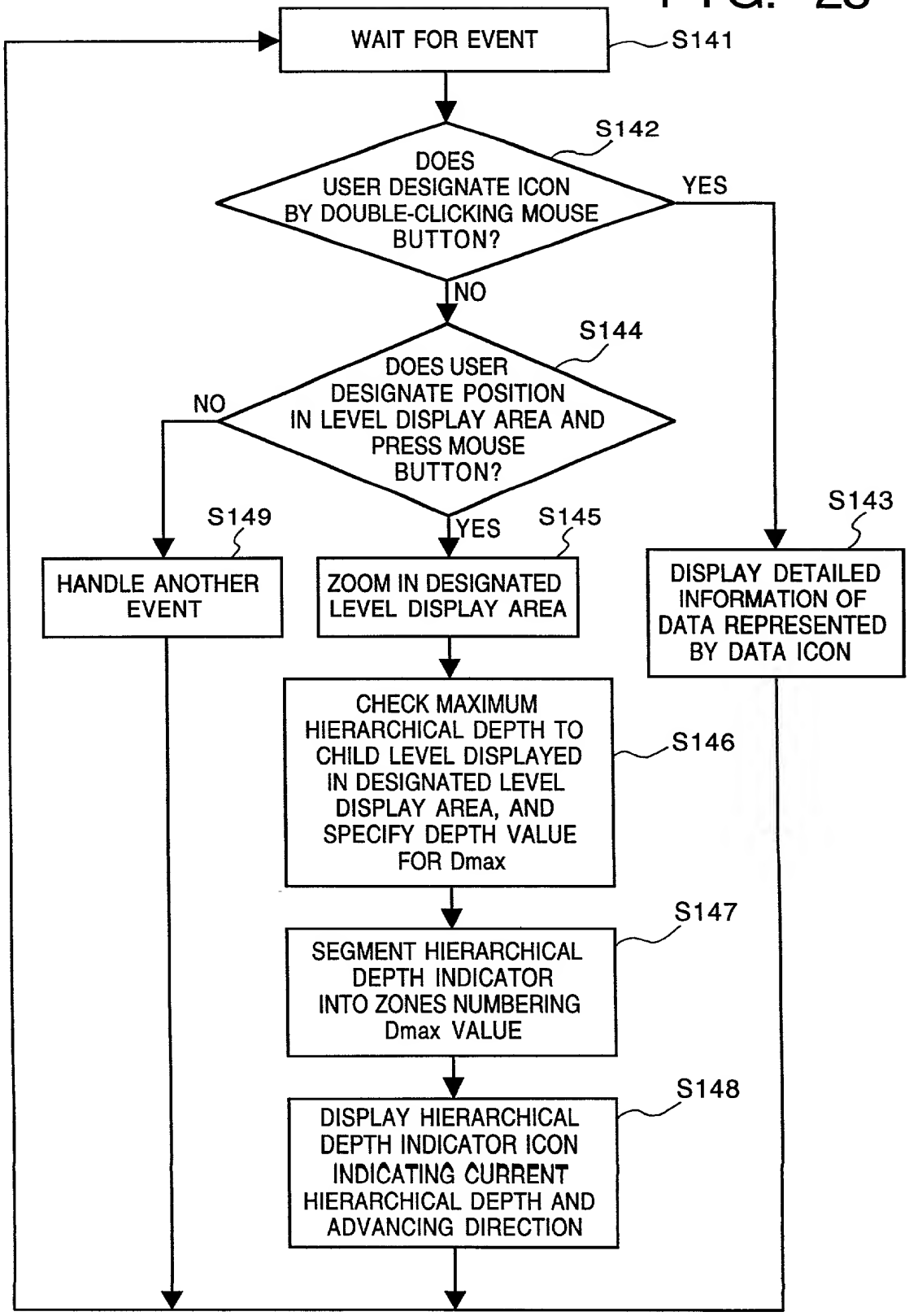

WAIT FOR EVENT
S141
S142
DOES USER DESIGNATE ICON BY DOUBLE-CLICKING MOUSE BUTTON?
YES
NO
S144
DOES USER DESIGNATE POSITION IN LEVEL DISPLAY AREA AND PRESS MOUSE BUTTON?
NO
YES
S149
S145
S143
HANDLE ANOTHER EVENT
ZOOM IN DESIGNATED LEVEL DISPLAY AREA
DISPLAY DETAILED INFORMATION OF DATA REPRESENTED BY DATA ICON
CHECK MAXIMUM HIERARCHICAL DEPTH TO CHILD LEVEL DISPLAYED IN DESIGNATED LEVEL DISPLAY AREA, AND SPECIFY DEPTH VALUE FOR Dmax
S146
SEGMENT HIERARCHICAL DEPTH INDICATOR INTO ZONES NUMBERING Dmax VALUE
S147
DISPLAY HIERARCHICAL DEPTH INDICATOR ICON INDICATING CURRENT HIERARCHICAL DEPTH AND ADVANCING DIRECTION
S148

FIG. 29

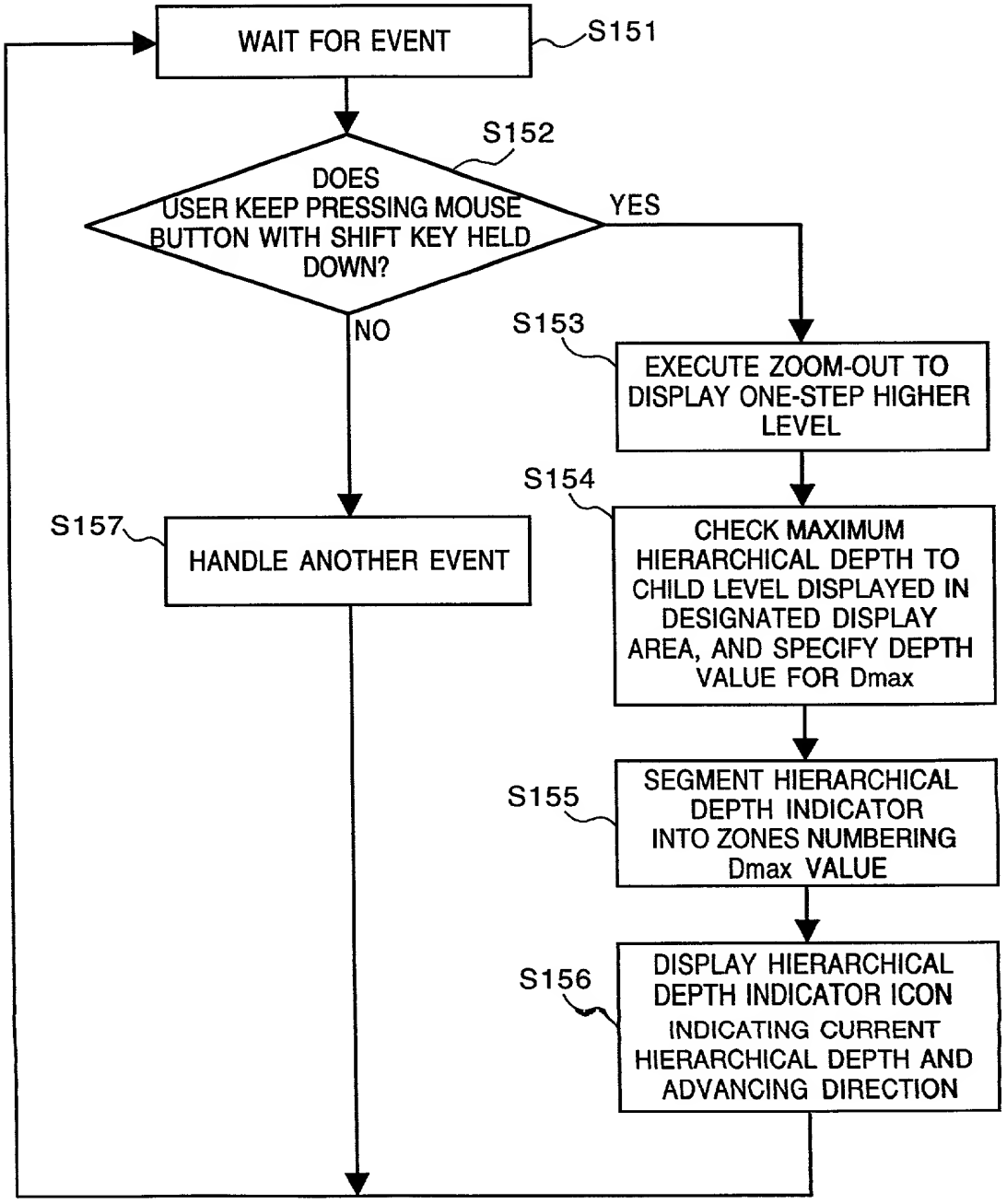

WAIT FOR EVENT
S151
S152
DOES USER KEEP PRESSING MOUSE BUTTON WITH SHIFT KEY HELD DOWN?
YES
NO
S153
EXECUTE ZOOM-OUT TO DISPLAY ONE-STEP HIGHER LEVEL
S154
CHECK MAXIMUM HIERARCHICAL DEPTH TO CHILD LEVEL DISPLAYED IN DESIGNATED DISPLAY AREA, AND SPECIFY DEPTH VALUE FOR Dmax
S155
SEGMENT HIERARCHICAL DEPTH INDICATOR INTO ZONES NUMBERING Dmax VALUE
S156
DISPLAY HIERARCHICAL DEPTH INDICATOR ICON INDICATING CURRENT HIERARCHICAL DEPTH AND ADVANCING DIRECTION
S157
HANDLE ANOTHER EVENT

FIG. 30

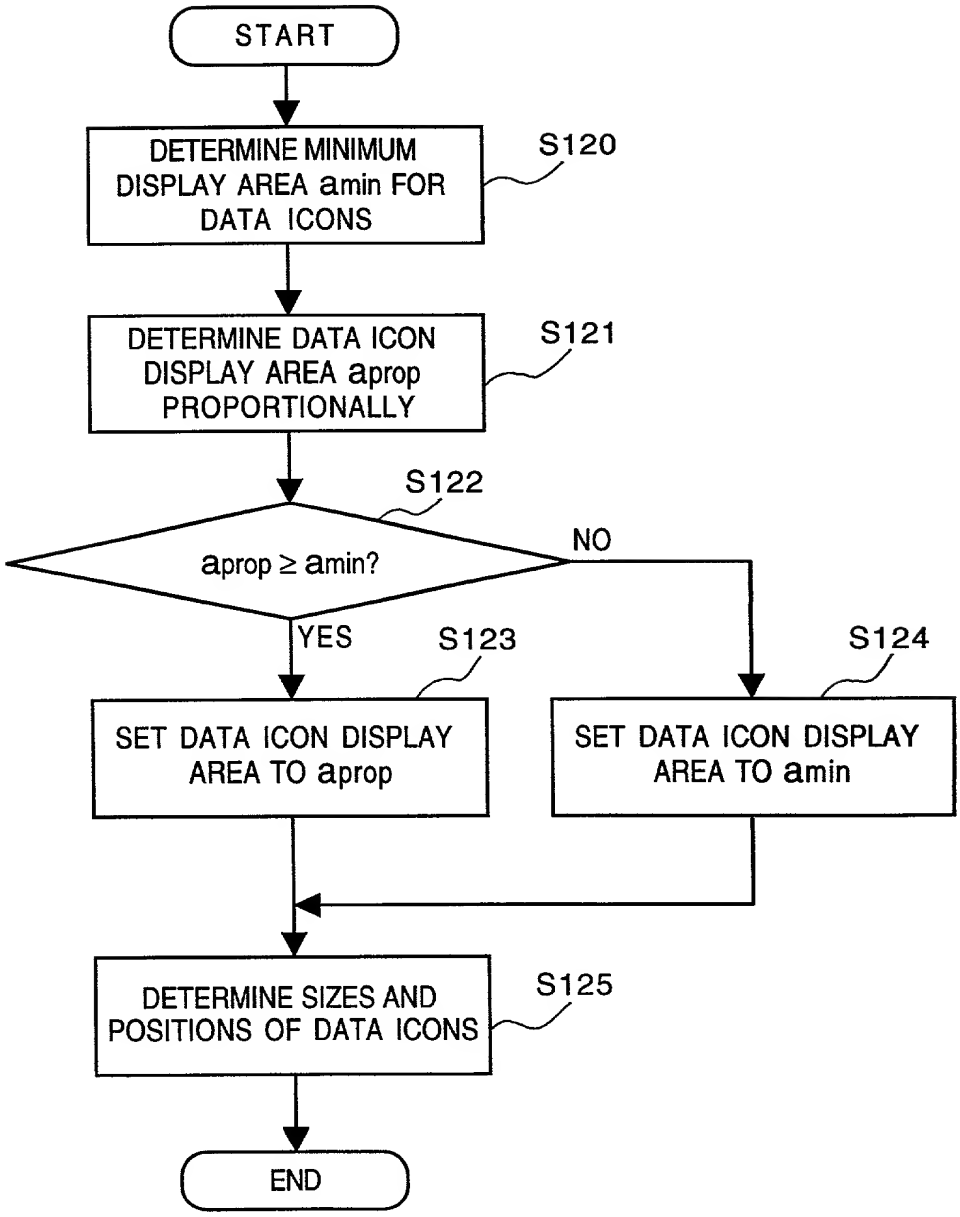

START
DETERMINE MINIMUM DISPLAY AREA amin FOR DATA ICONS
S120
DETERMINE DATA ICON DISPLAY AREA aprop PROPORTIONALLY
S121
S122
aprop ≥ amin?
NO
YES
S123
S124
SET DATA ICON DISPLAY AREA TO aprop
SET DATA ICON DISPLAY AREA TO amin
DETERMINE SIZES AND POSITIONS OF DATA ICONS
S125
END

FIG. 31

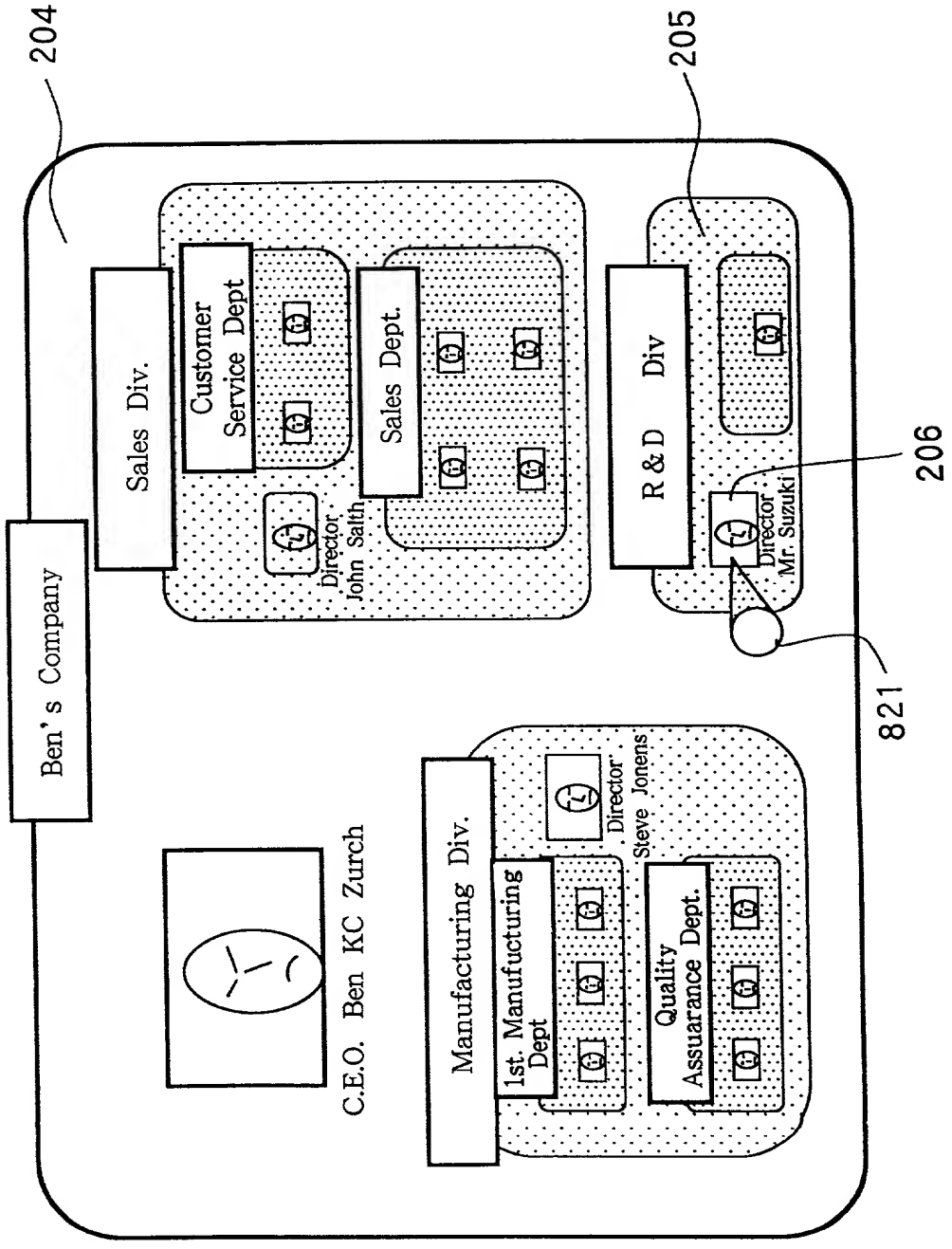

204
205
206
821
Ben's Company
Sales Div.
Customer Service Dept
Director John Saith
Sales Dept.
R & D Div
Director Mr. Suzuki
C.E.O. Ben KC Zurch
Manufacturing Div.
1st. Manufucturing Dept
Director Steve Jonens
Quality Assuarance Dept.

FIG. 32

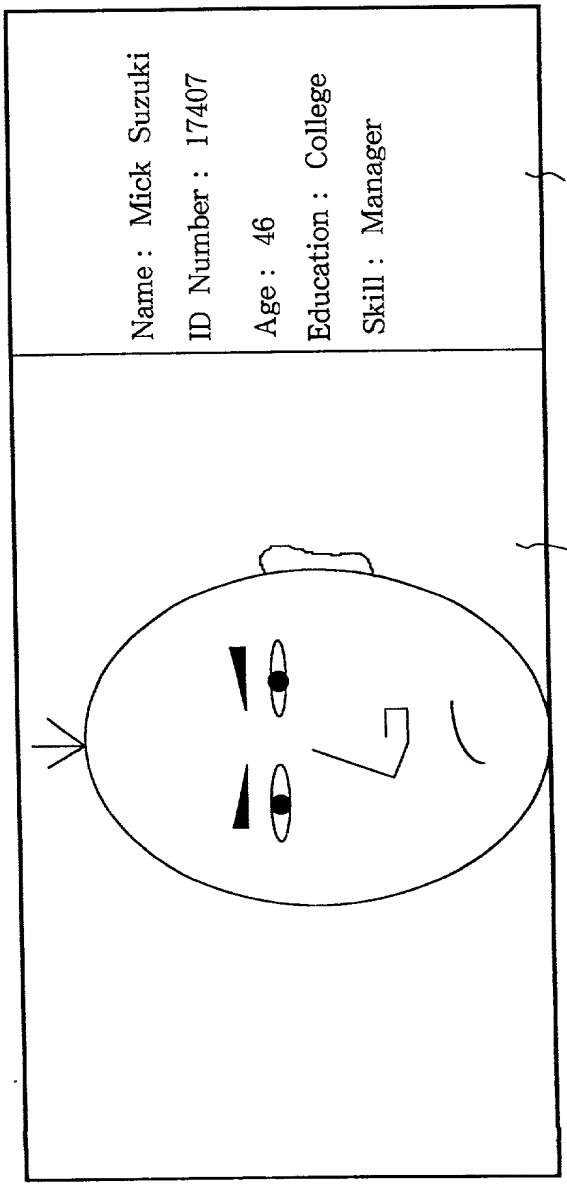

Name : Mick Suzuki
ID Number : 17407
Age : 46
Education : College
Skill : Manager
207
206

FIG. 33

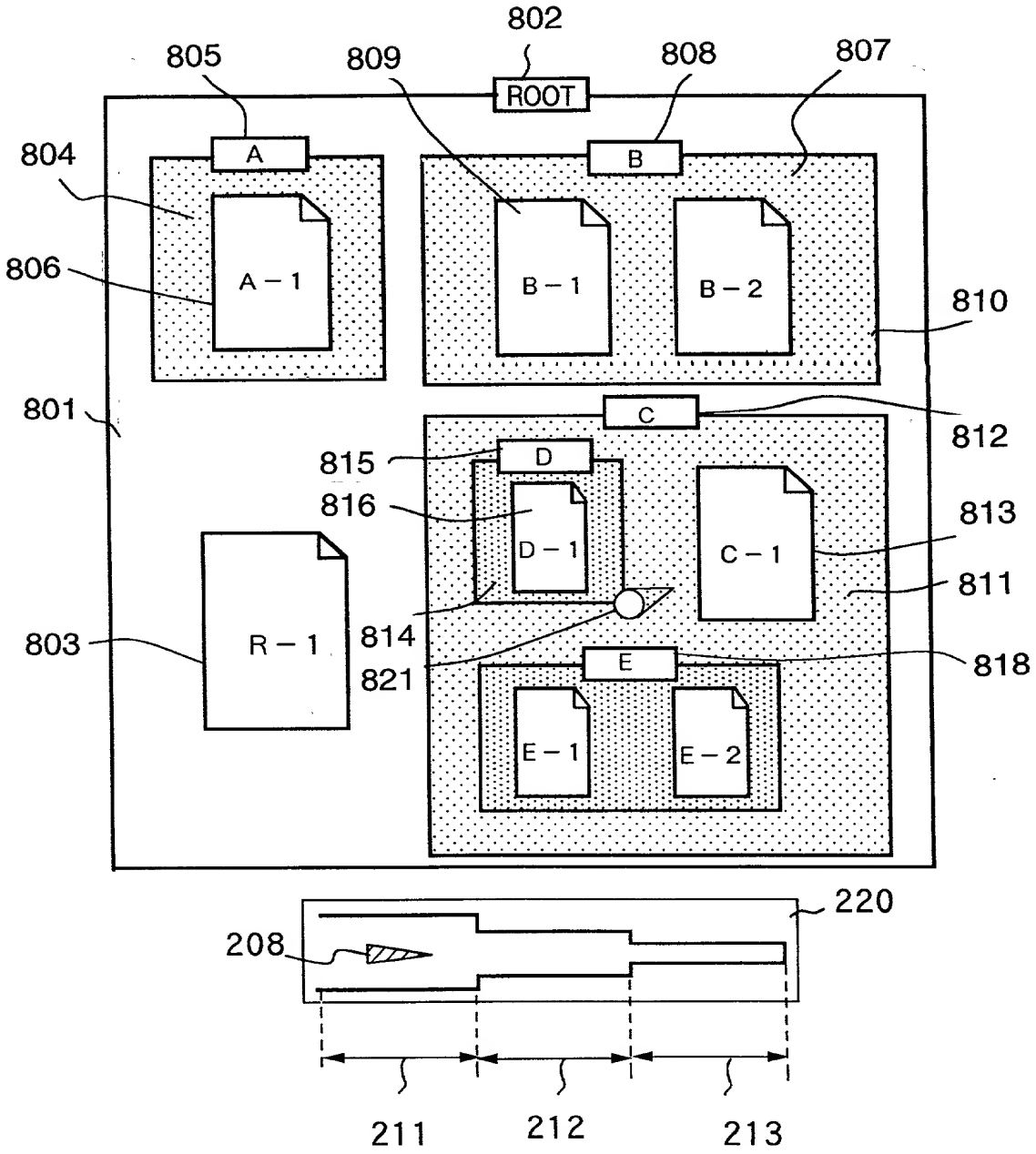

802
805
809
808
807
ROOT
804
A
B
806
A – 1
B – 1
B – 2
810
801
C
812
815
D
816
D – 1
C – 1
813
811
803
R – 1
814
821
E
818
E – 1
E – 2
220
208
211
212
213

FIG. 34

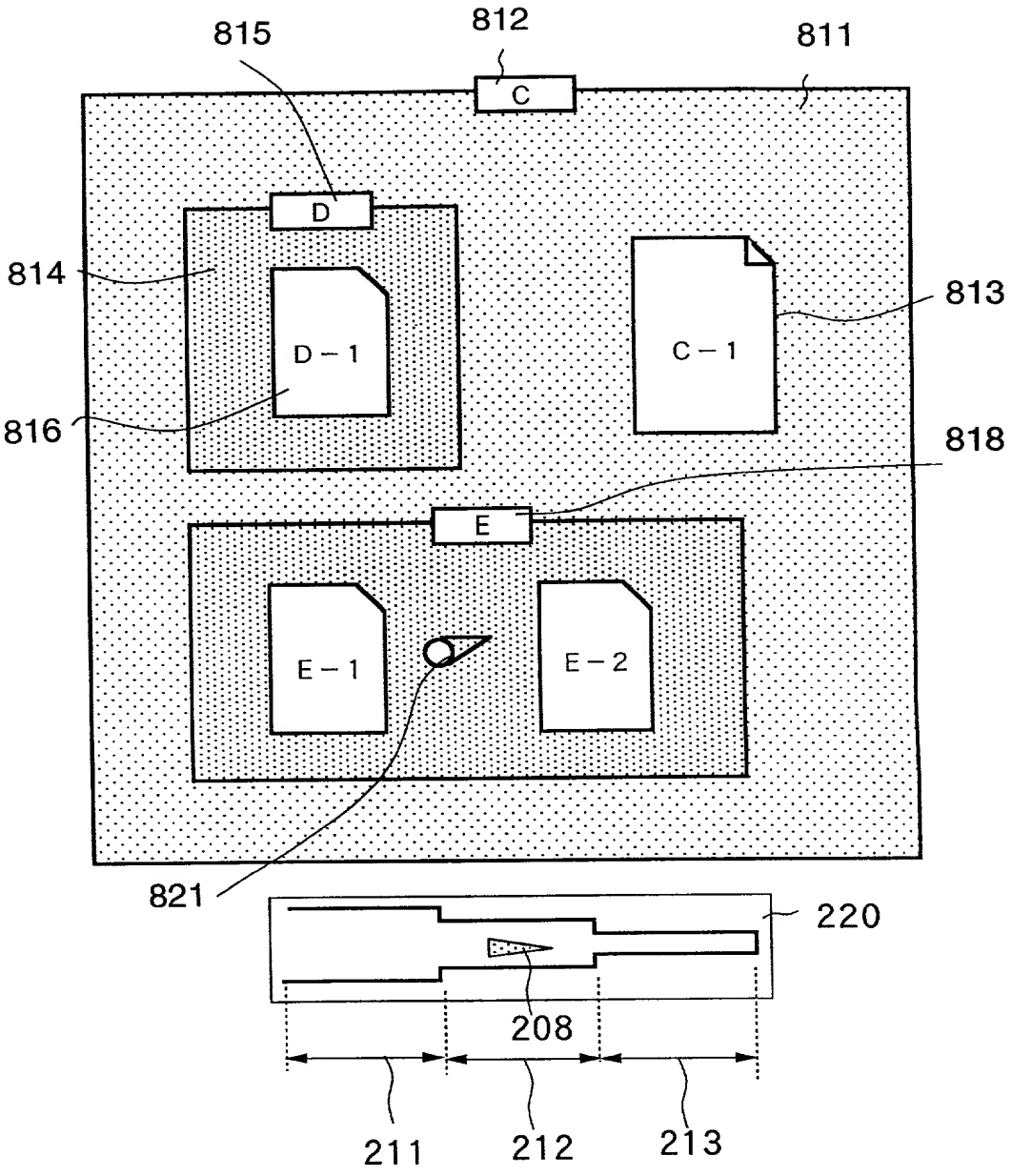

815
812
811
C
D
814
D－1
C－1
813
816
818
E
E－1
E－2
821
220
208
211
212
213

FIG. 35

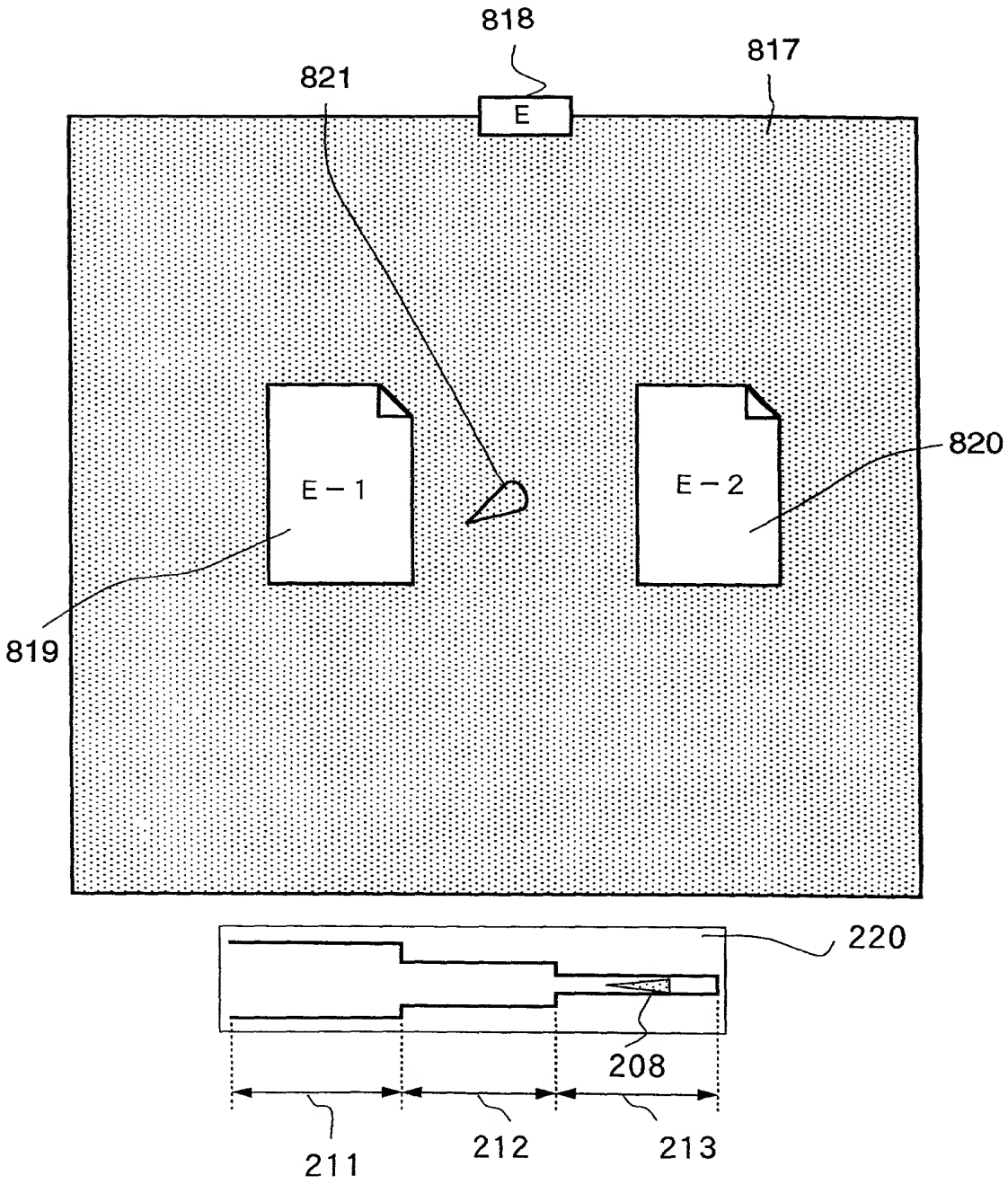


FIG. 36

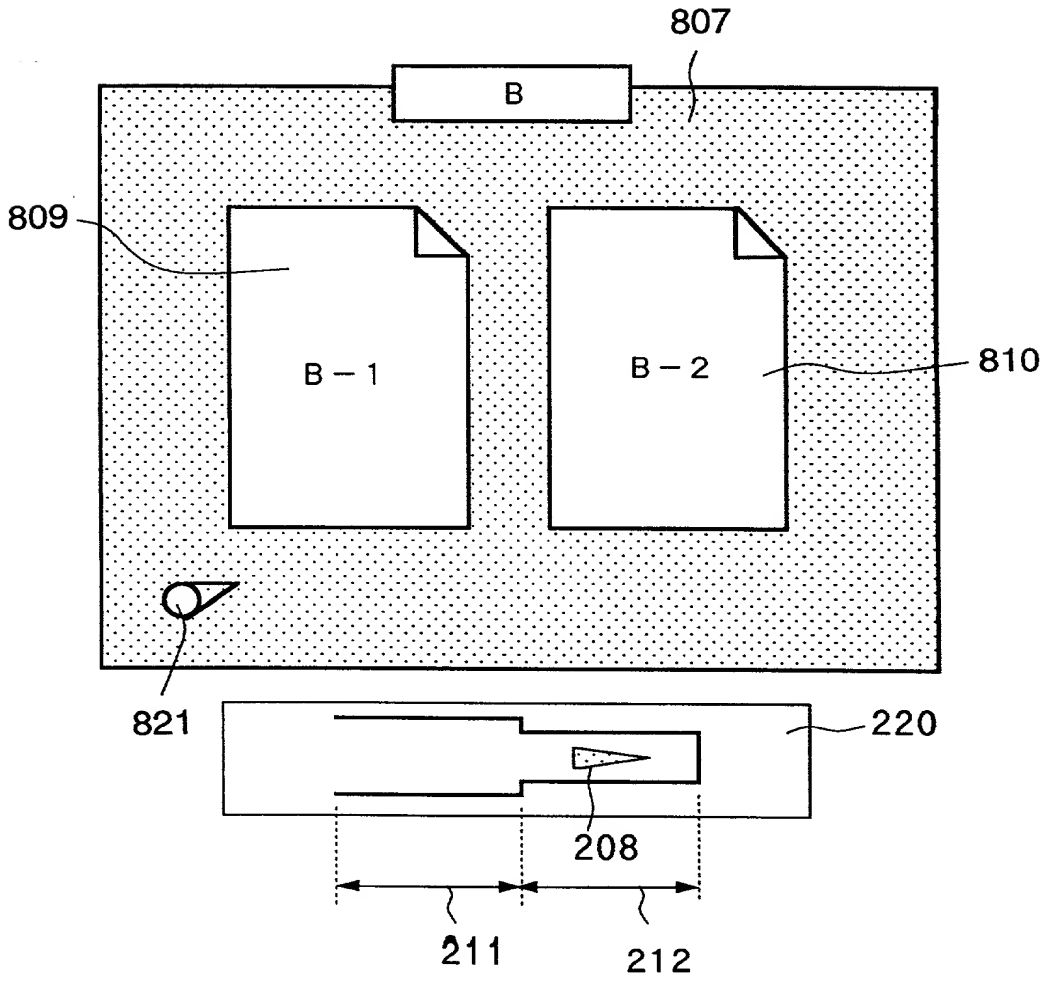


FIG. 37

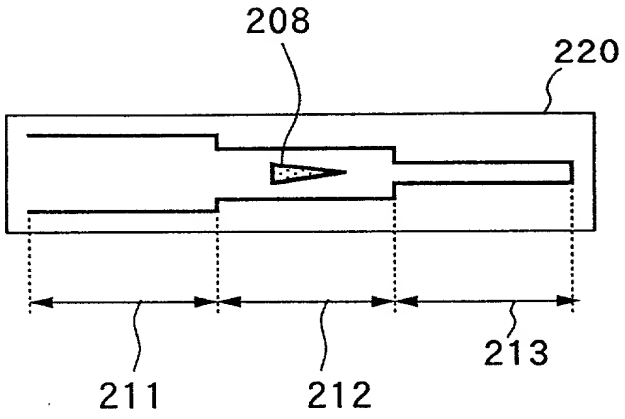


FIG. 38

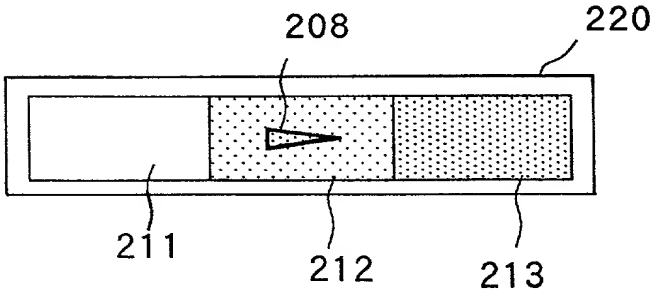


FIG. 39

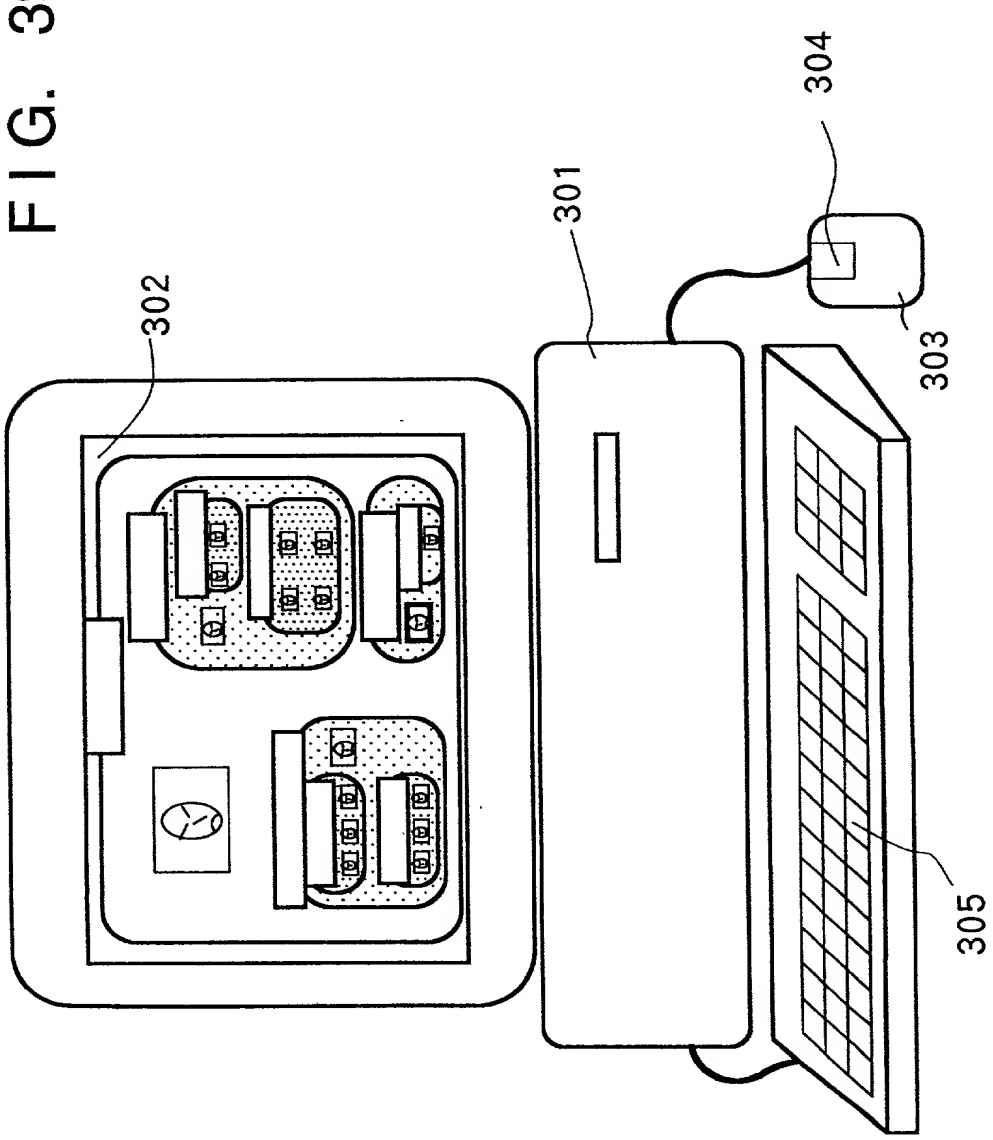


FIG. 40

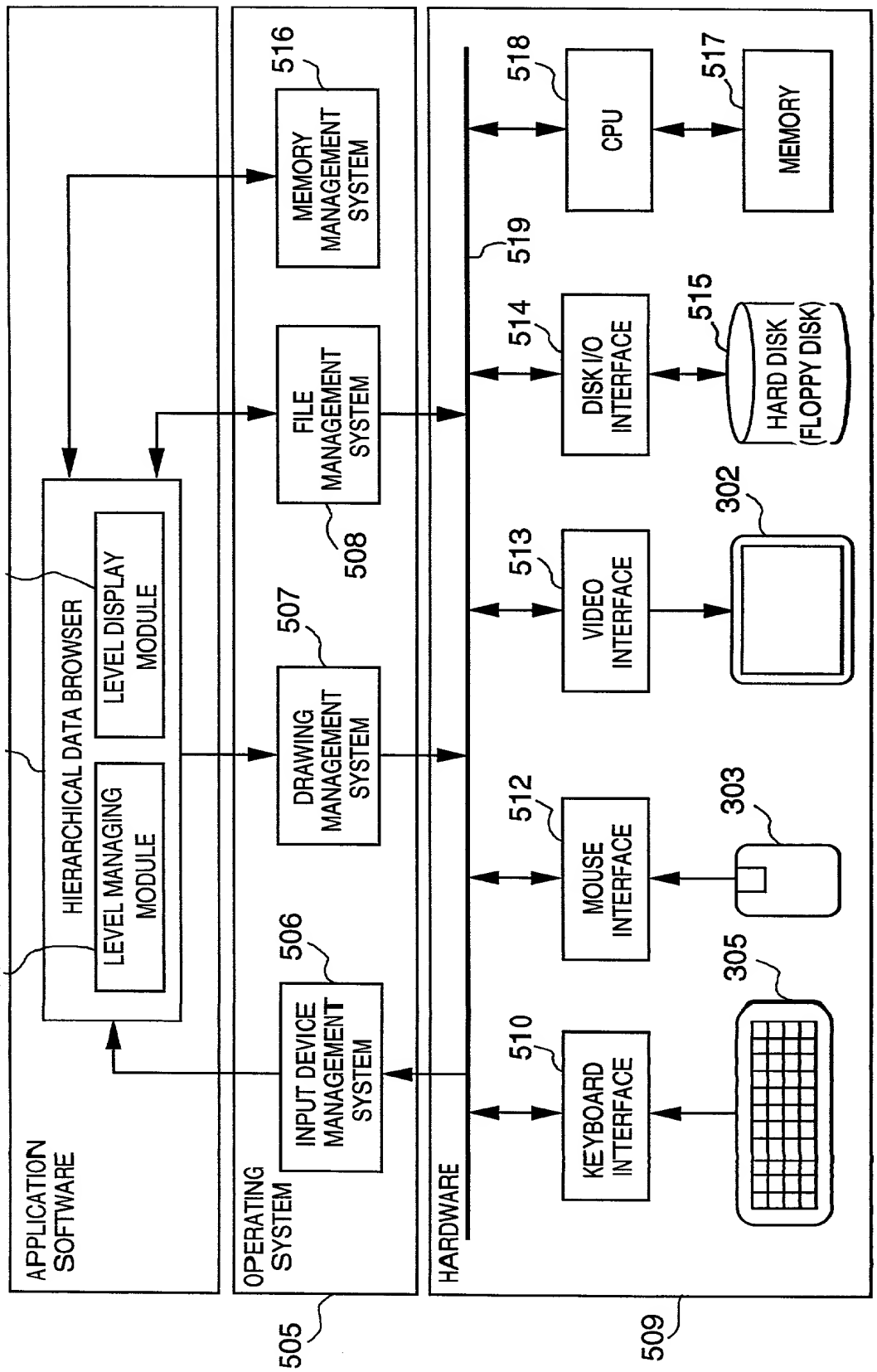

APPLICATION SOFTWARE
HIERARCHICAL DATA BROWSER
LEVEL MANAGING MODULE
LEVEL DISPLAY MODULE
1501
1502
1503
OPERATING SYSTEM
INPUT DEVICE MANAGEMENT SYSTEM
DRAWING MANAGEMENT SYSTEM
FILE MANAGEMENT SYSTEM
MEMORY MANAGEMENT SYSTEM
505
506
507
508
516
HARDWARE
KEYBOARD INTERFACE
MOUSE INTERFACE
VIDEO INTERFACE
DISK I/O INTERFACE
CPU
MEMORY
HARD DISK (FLOPPY DISK)
509
510
512
513
514
515
517
518
519
302
303
305

FIG. 41

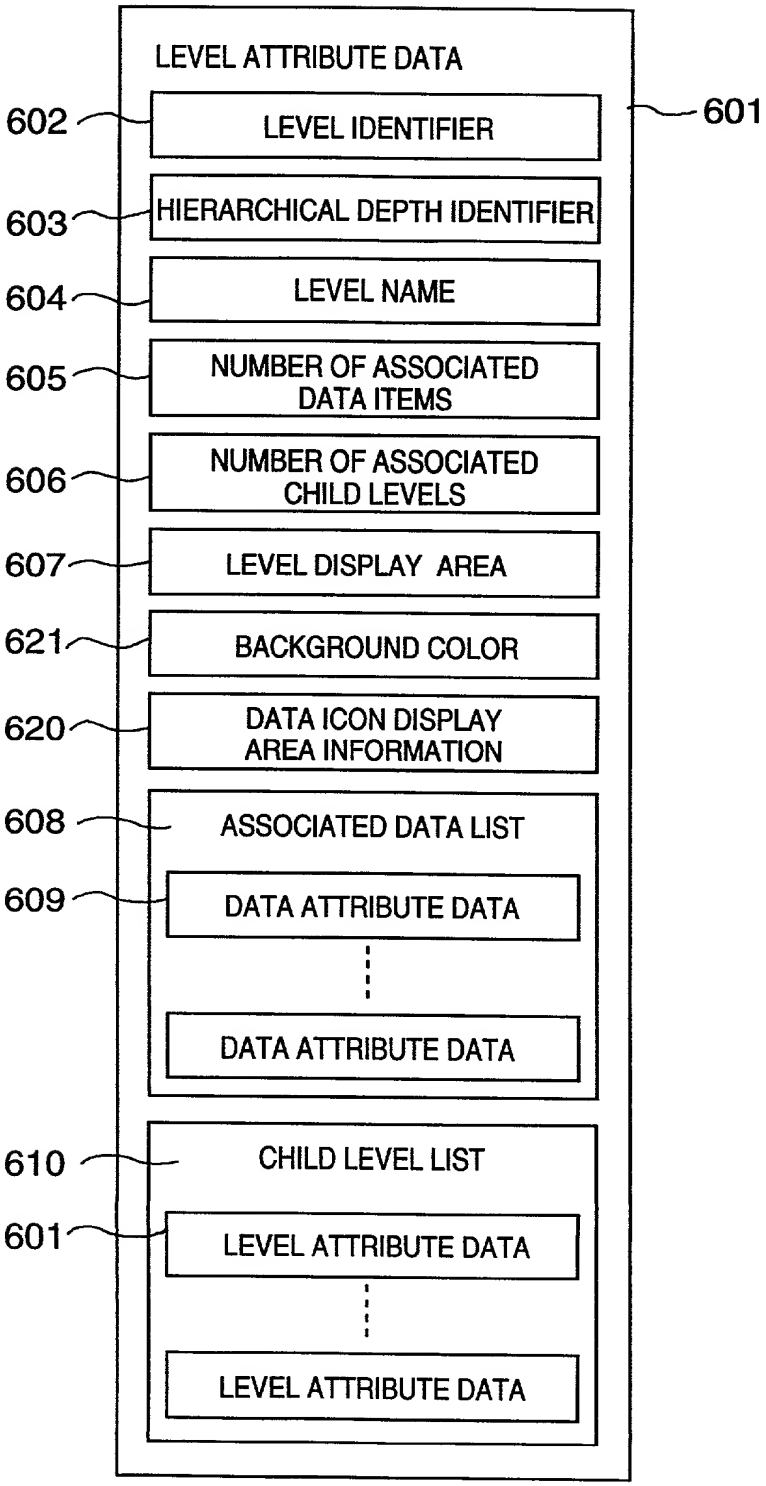

LEVEL ATTRIBUTE DATA
601
602
LEVEL IDENTIFIER
603
HIERARCHICAL DEPTH IDENTIFIER
604
LEVEL NAME
605
NUMBER OF ASSOCIATED DATA ITEMS
606
NUMBER OF ASSOCIATED CHILD LEVELS
607
LEVEL DISPLAY AREA
621
BACKGROUND COLOR
620
DATA ICON DISPLAY AREA INFORMATION
608
ASSOCIATED DATA LIST
609
DATA ATTRIBUTE DATA
DATA ATTRIBUTE DATA
610
CHILD LEVEL LIST
601
LEVEL ATTRIBUTE DATA
LEVEL ATTRIBUTE DATA

FIG. 42

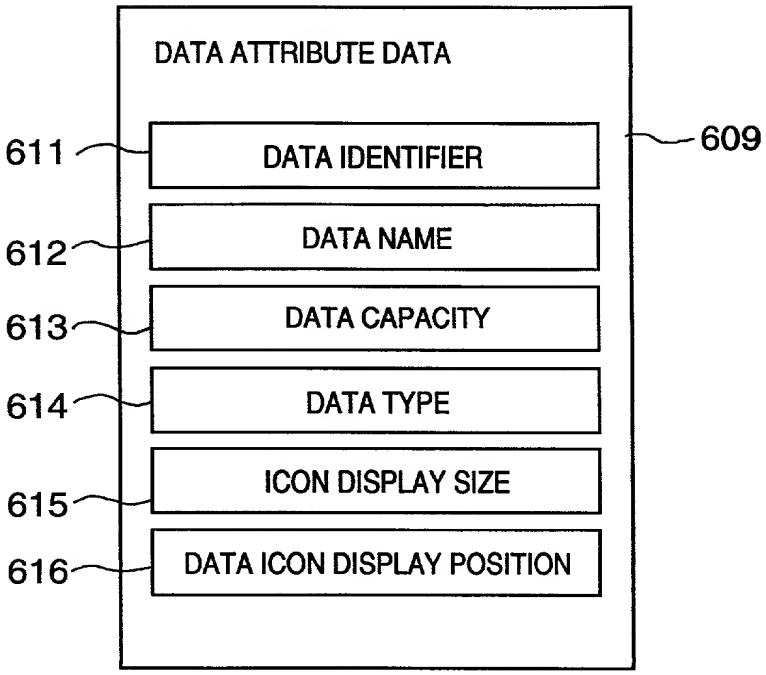

DATA ATTRIBUTE DATA
609
611
DATA IDENTIFIER
612
DATA NAME
613
DATA CAPACITY
614
DATA TYPE
615
ICON DISPLAY SIZE
616
DATA ICON DISPLAY POSITION

FIG. 43

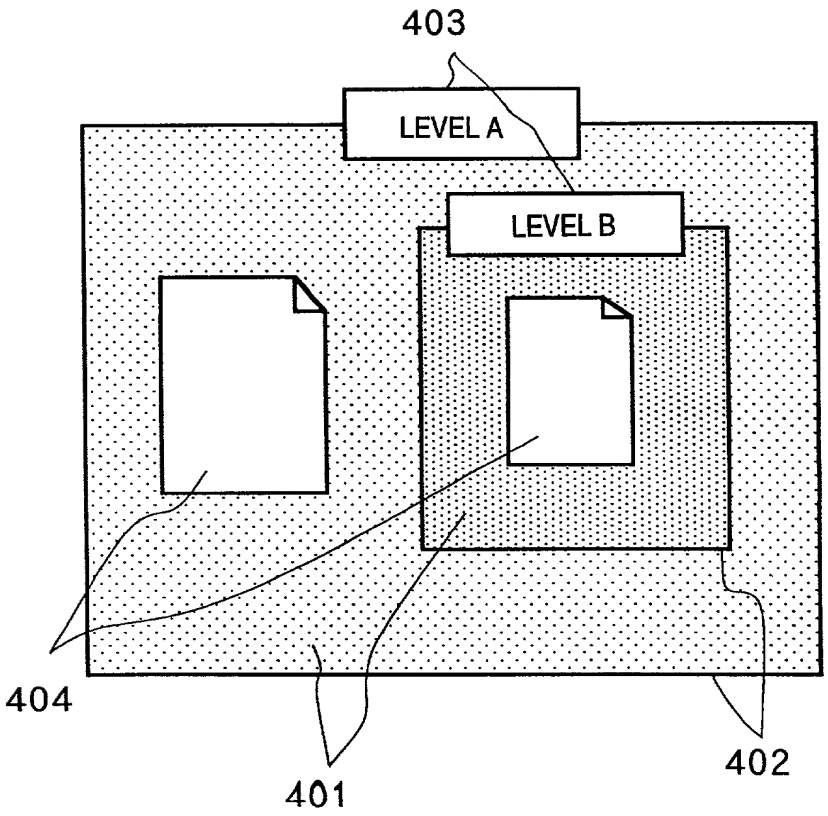


FIG. 44

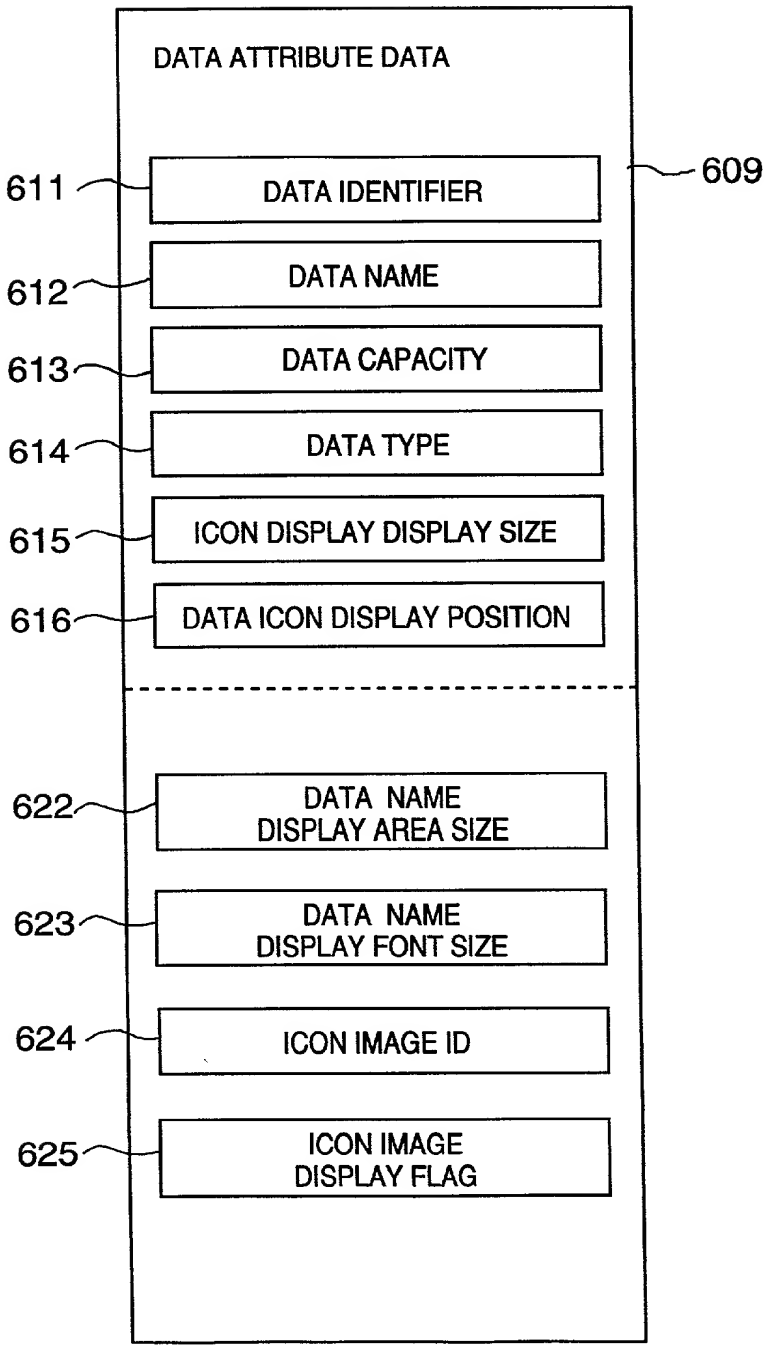

DATA ATTRIBUTE DATA
609
611
DATA IDENTIFIER
612
DATA NAME
613
DATA CAPACITY
614
DATA TYPE
615
ICON DISPLAY DISPLAY SIZE
616
DATA ICON DISPLAY POSITION
622
DATA NAME DISPLAY AREA SIZE
623
DATA NAME DISPLAY FONT SIZE
624
ICON IMAGE ID
625
ICON IMAGE DISPLAY FLAG

FIG. 45

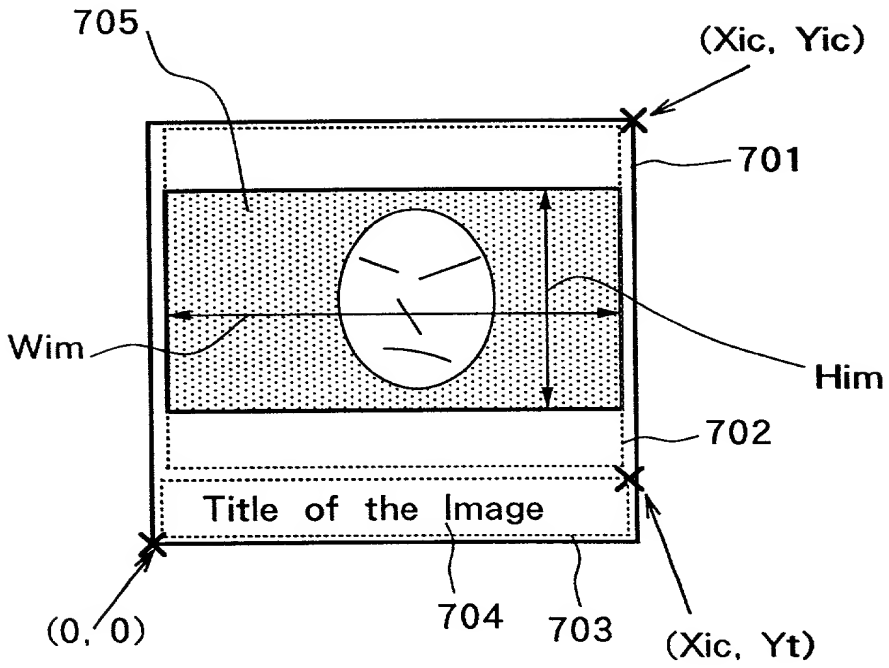


FIG. 46

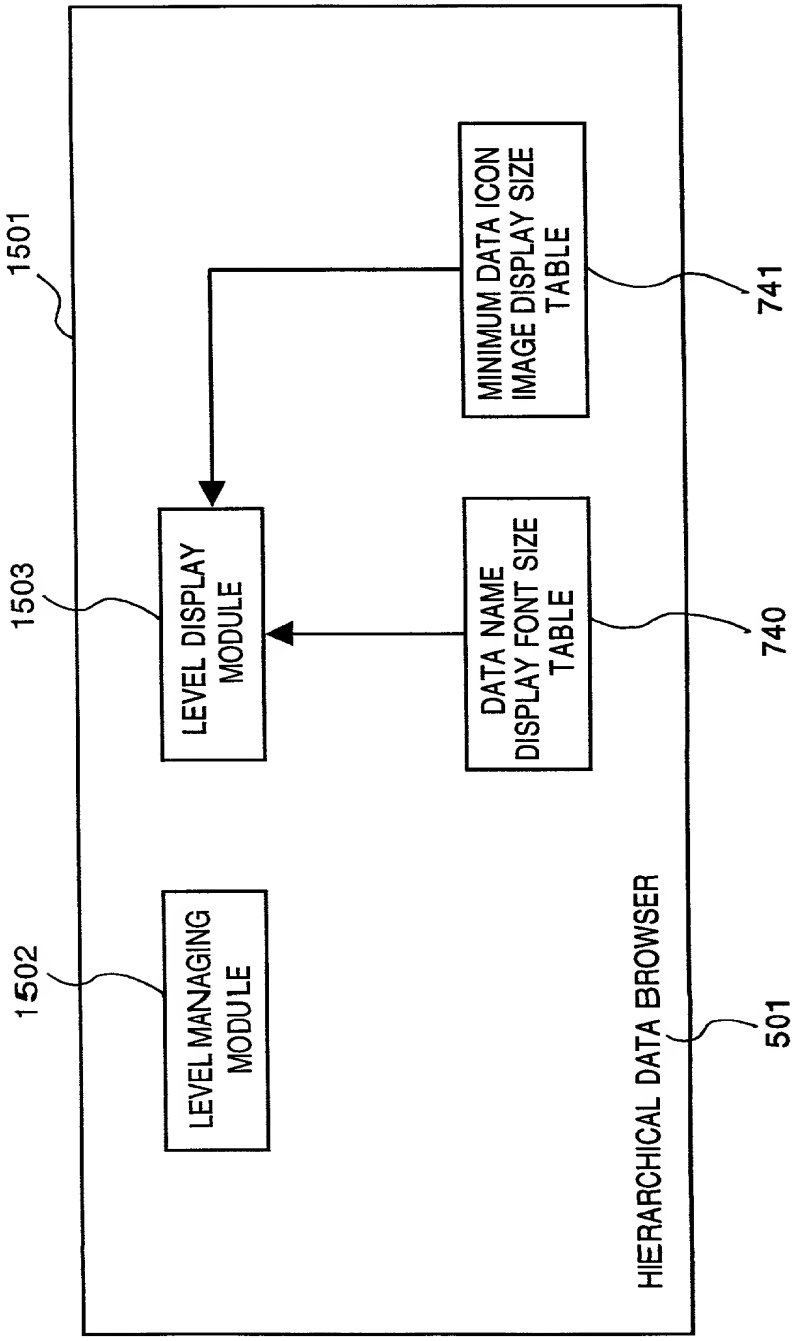

1501
HIERARCHICAL DATA BROWSER
501
1502
LEVEL MANAGING MODULE
1503
LEVEL DISPLAY MODULE
740
DATA NAME DISPLAY FONT SIZE TABLE
741
MINIMUM DATA ICON IMAGE DISPLAY SIZE TABLE

FIG. 47

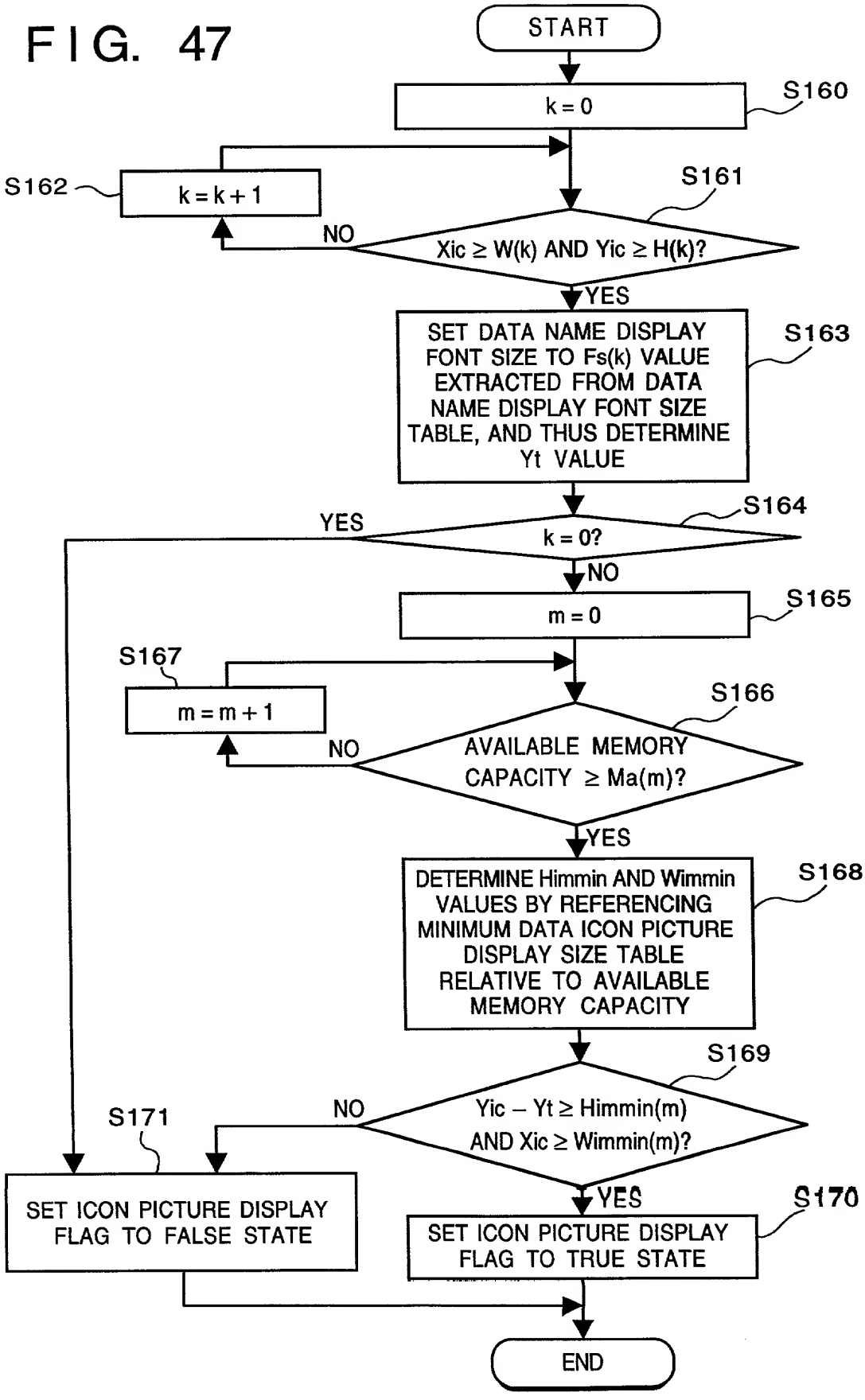

START
k = 0
S160
S162
k = k + 1
S161
NO
Xic ≥ W(k) AND Yic ≥ H(k)?
YES
SET DATA NAME DISPLAY FONT SIZE TO Fs(k) VALUE EXTRACTED FROM DATA NAME DISPLAY FONT SIZE TABLE, AND THUS DETERMINE Yt VALUE
S163
YES
k = 0?
S164
NO
m = 0
S165
S167
m = m + 1
S166
NO
AVAILABLE MEMORY CAPACITY ≥ Ma(m)?
YES
DETERMINE Himmin AND Wimmin VALUES BY REFERENCING MINIMUM DATA ICON PICTURE DISPLAY SIZE TABLE RELATIVE TO AVAILABLE MEMORY CAPACITY
S168
S169
NO
Yic – Yt ≥ Himmin(m) AND Xic ≥ Wimmin(m)?
S171
YES
S170
SET ICON PICTURE DISPLAY FLAG TO FALSE STATE
SET ICON PICTURE DISPLAY FLAG TO TRUE STATE
END

FIG. 48

DATA NAME DISPLAY FONT SIZE TABLE 740

k	W (k)	H (k)	Fs (k)
0	0	0	0
1	w1	h1	fs1
2	w2	h2	fs2
3	w3	h3	fs3

FIG. 49

MINIMUM ICON PICTURE DISPLAY AREA SIZE TABLE 741

m	AVAILABLE MEMORY CAPACITY Ma (m)	Wimmin (m)	Himmin (m)
0	ma0	wm0	hm0
1	ma1	wm1	hm1
2	ma2	wm2	hm2
3	ma3	wm3	hm3

FIG. 50

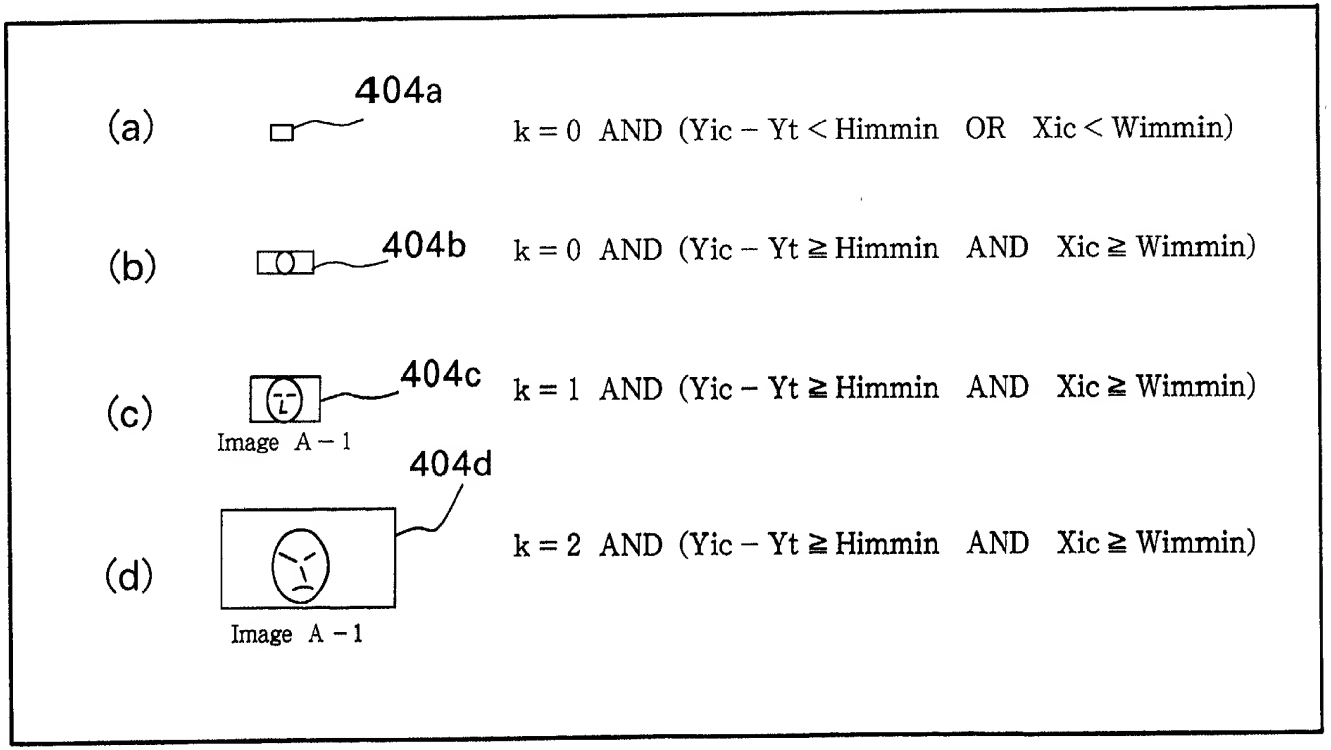

(a)
404a
k = 0 AND (Yic − Yt < Himmin OR Xic < Wimmin)
(b)
404b
k = 0 AND (Yic − Yt ≧ Himmin AND Xic ≧ Wimmin)
(c)
404c
Image A − 1
k = 1 AND (Yic − Yt ≧ Himmin AND Xic ≧ Wimmin)
(d)
404d
Image A − 1
k = 2 AND (Yic − Yt ≧ Himmin AND Xic ≧ Wimmin)

FIG. 51

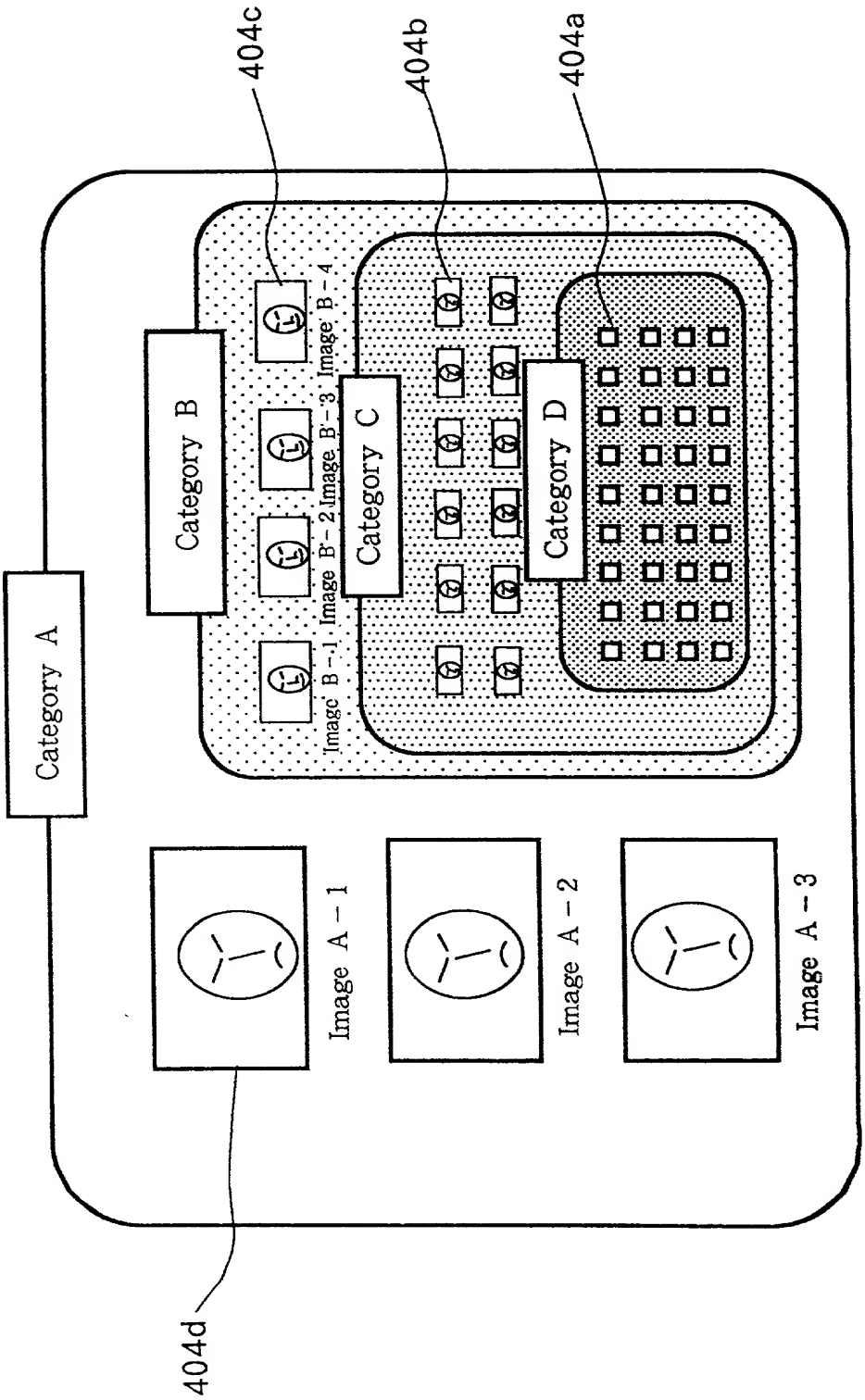
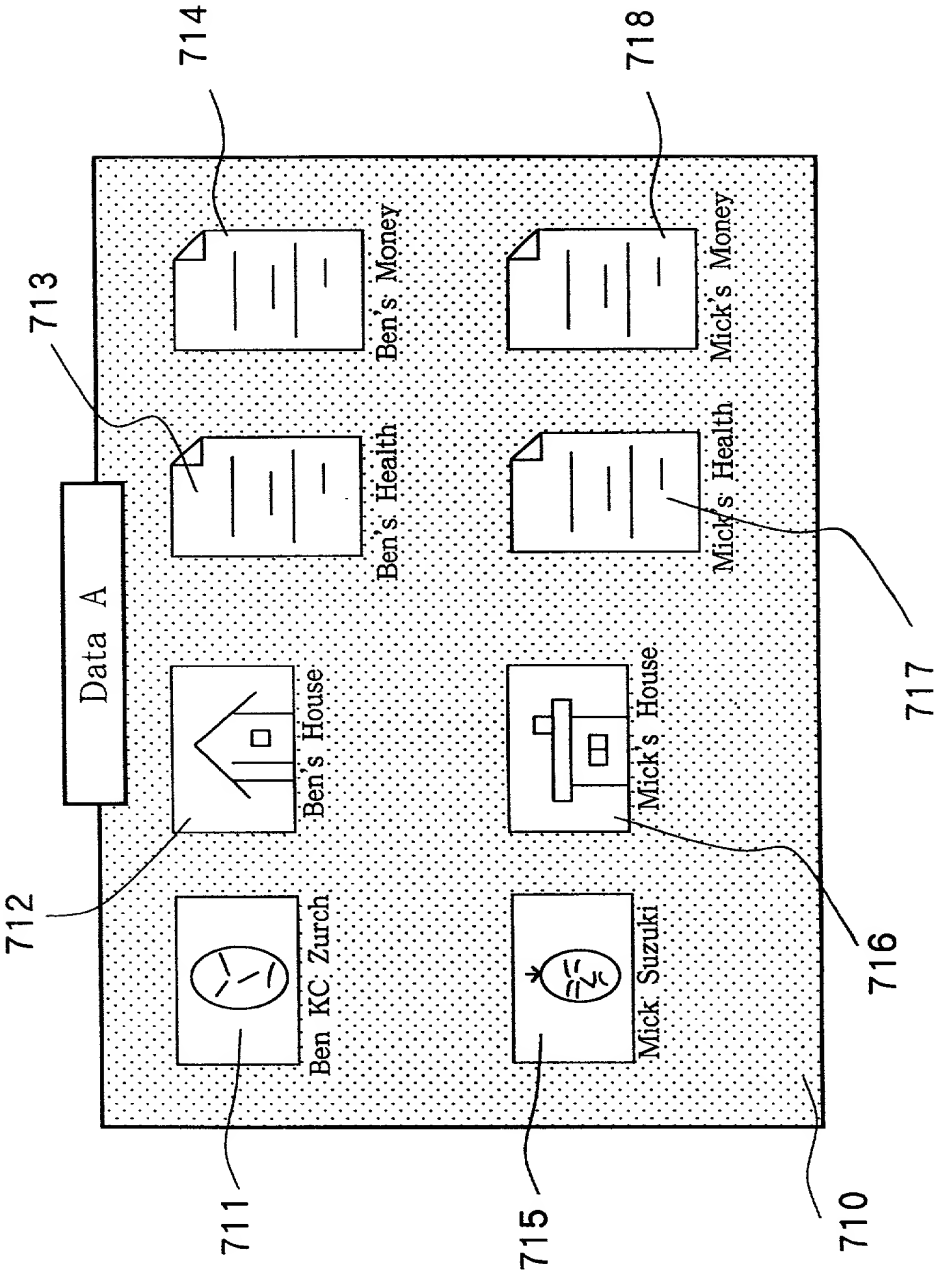

404c
404b
404a
Category A
Category B
Category C
Category D
Image B - 1
Image B - 2
Image B - 3
Image B - 4
Image A - 1
Image A - 2
Image A - 3
404d

FIG. 52


714
718
713
Ben's Money
Mick's Money
Data A
Ben's Health
Mick's Health
717
Ben's House
Mick's House
712
716
Ben KC Zurch
Mick Suzuki
711
715
710

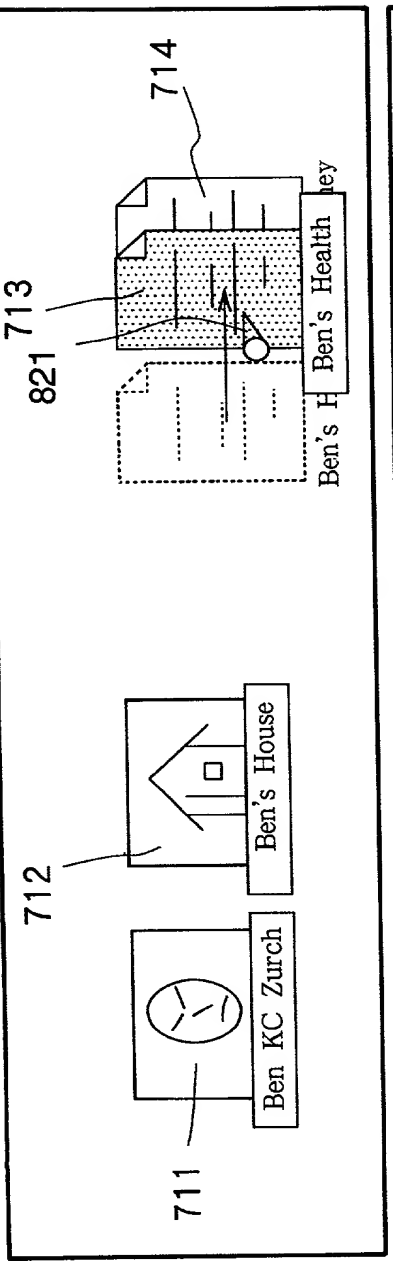


FIG. 53A

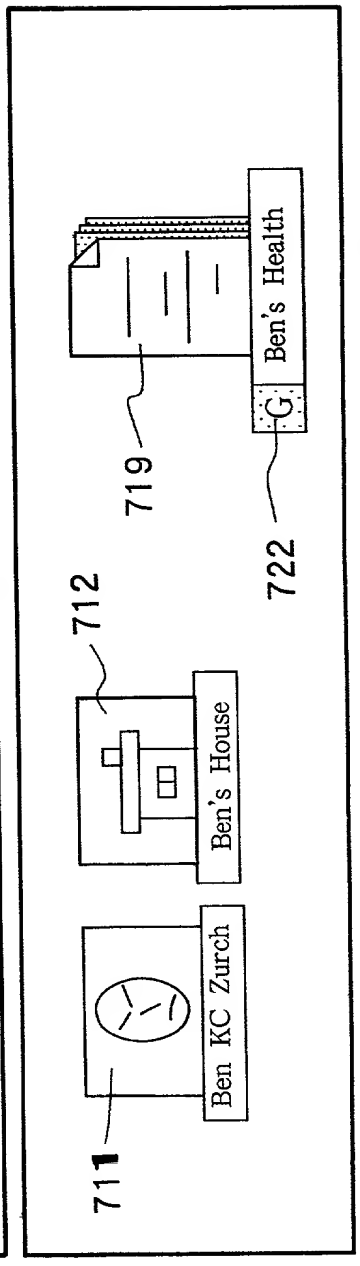


FIG. 53B

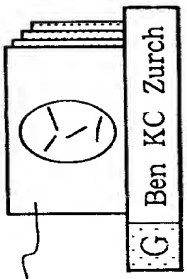


FIG. 53C

FIG. 54

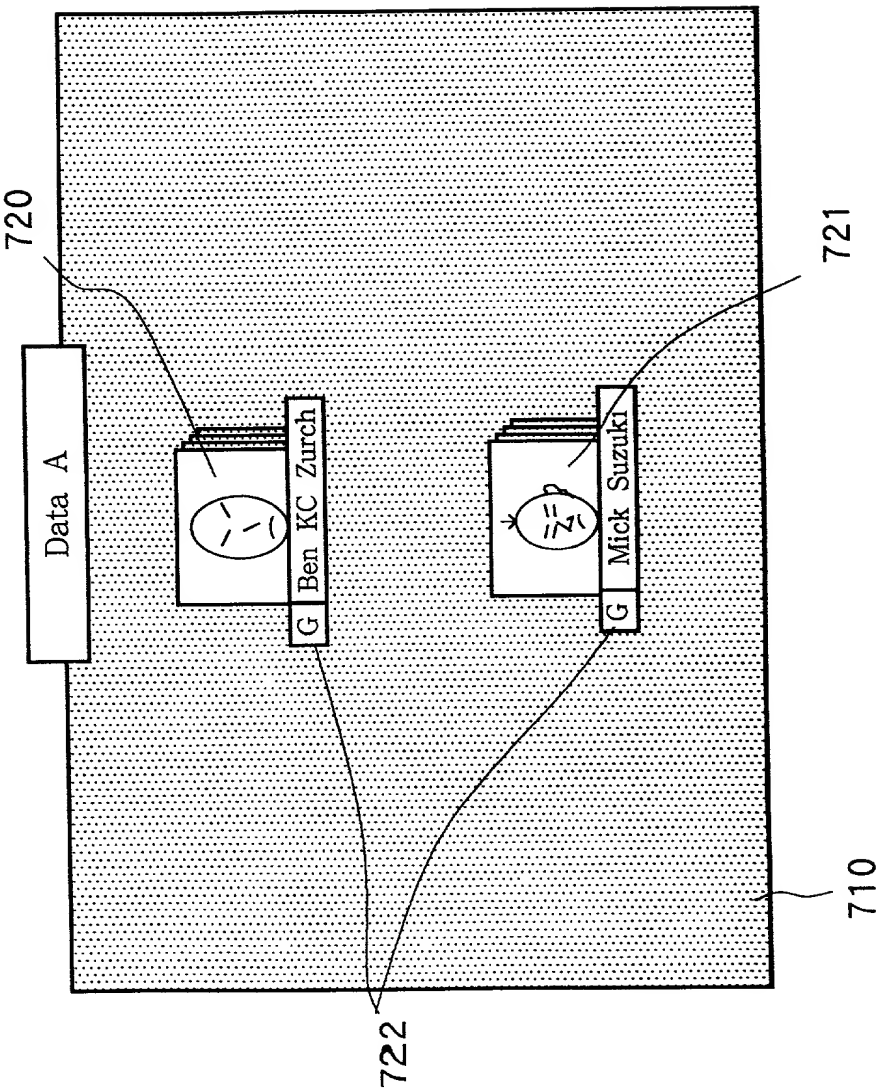
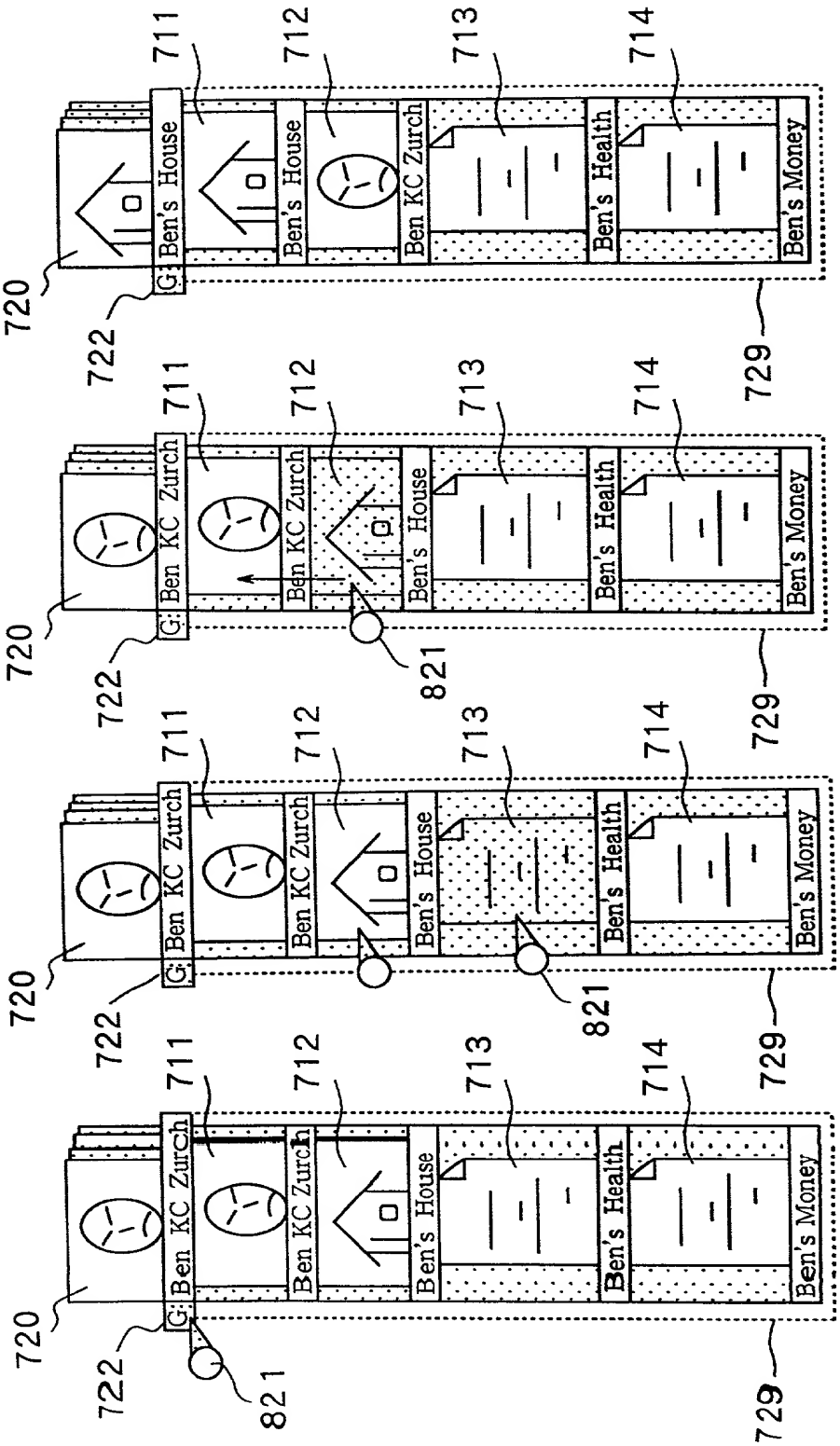


FIG. 55A FIG. 55B FIG. 55C FIG. 55D



JP2004-265450

FIG. 56A

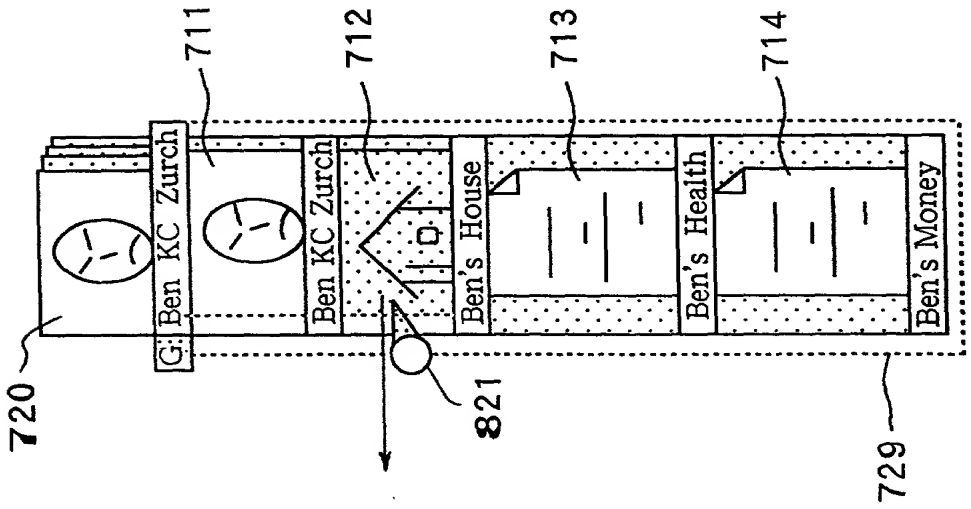


FIG. 56B

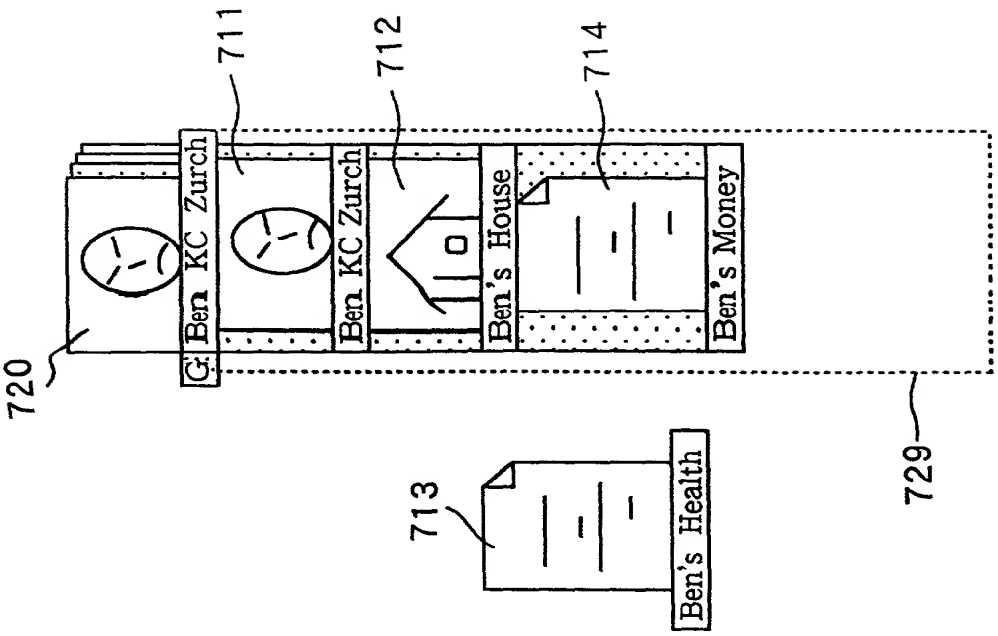


FIG. 57

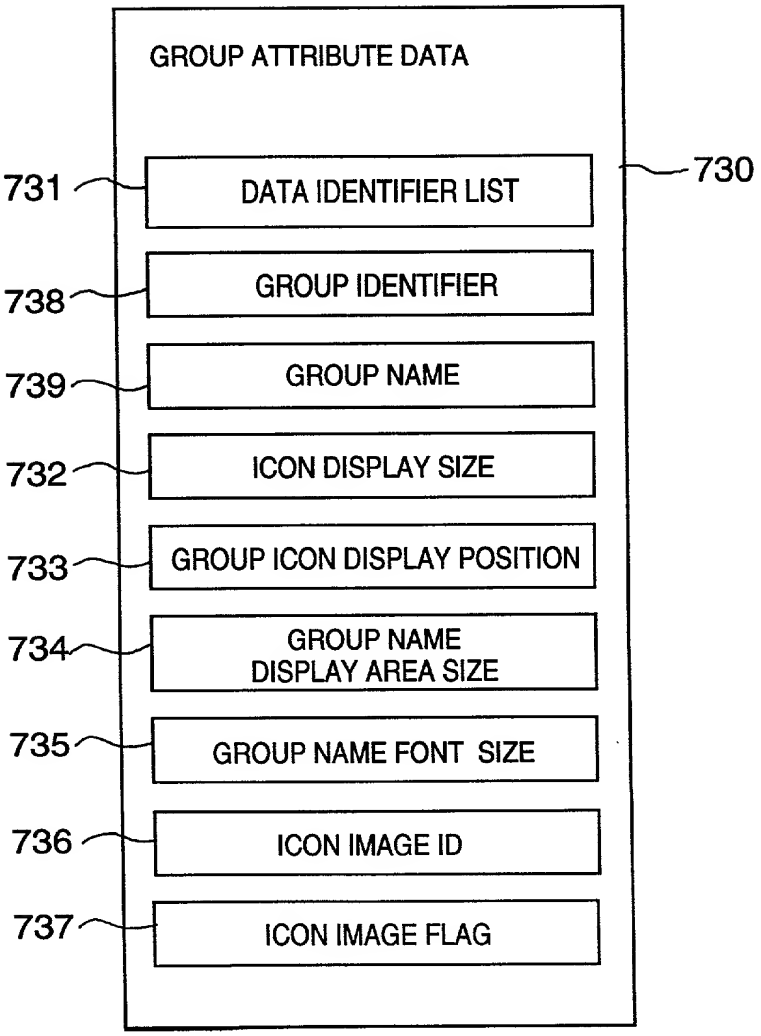
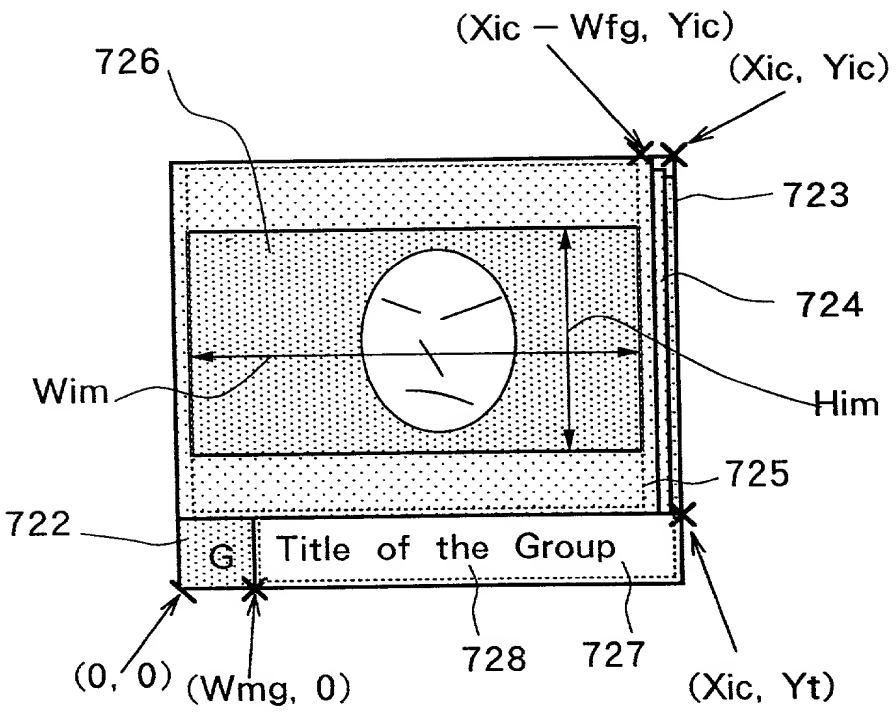

GROUP ATTRIBUTE DATA
730
731
DATA IDENTIFIER LIST
738
GROUP IDENTIFIER
739
GROUP NAME
732
ICON DISPLAY SIZE
733
GROUP ICON DISPLAY POSITION
734
GROUP NAME DISPLAY AREA SIZE
735
GROUP NAME FONT SIZE
736
ICON IMAGE ID
737
ICON IMAGE FLAG

FIG. 58


(Xic − Wfg, Yic)
(Xic, Yic)
726
723
724
Wim
Him
725
722
G
Title of the Group
728
727
(0, 0)
(Wmg, 0)
(Xic, Yt)

EPO - DG 1

FIG. 59

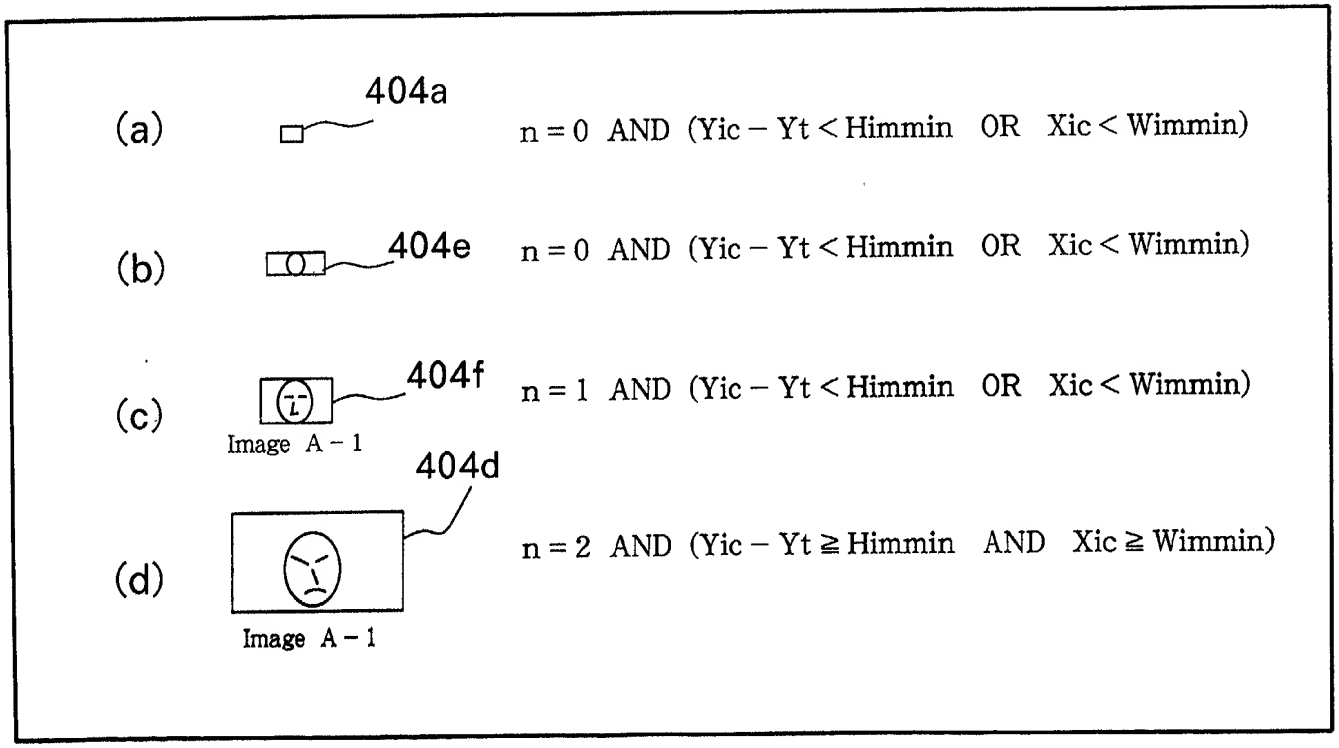


FIG. 60

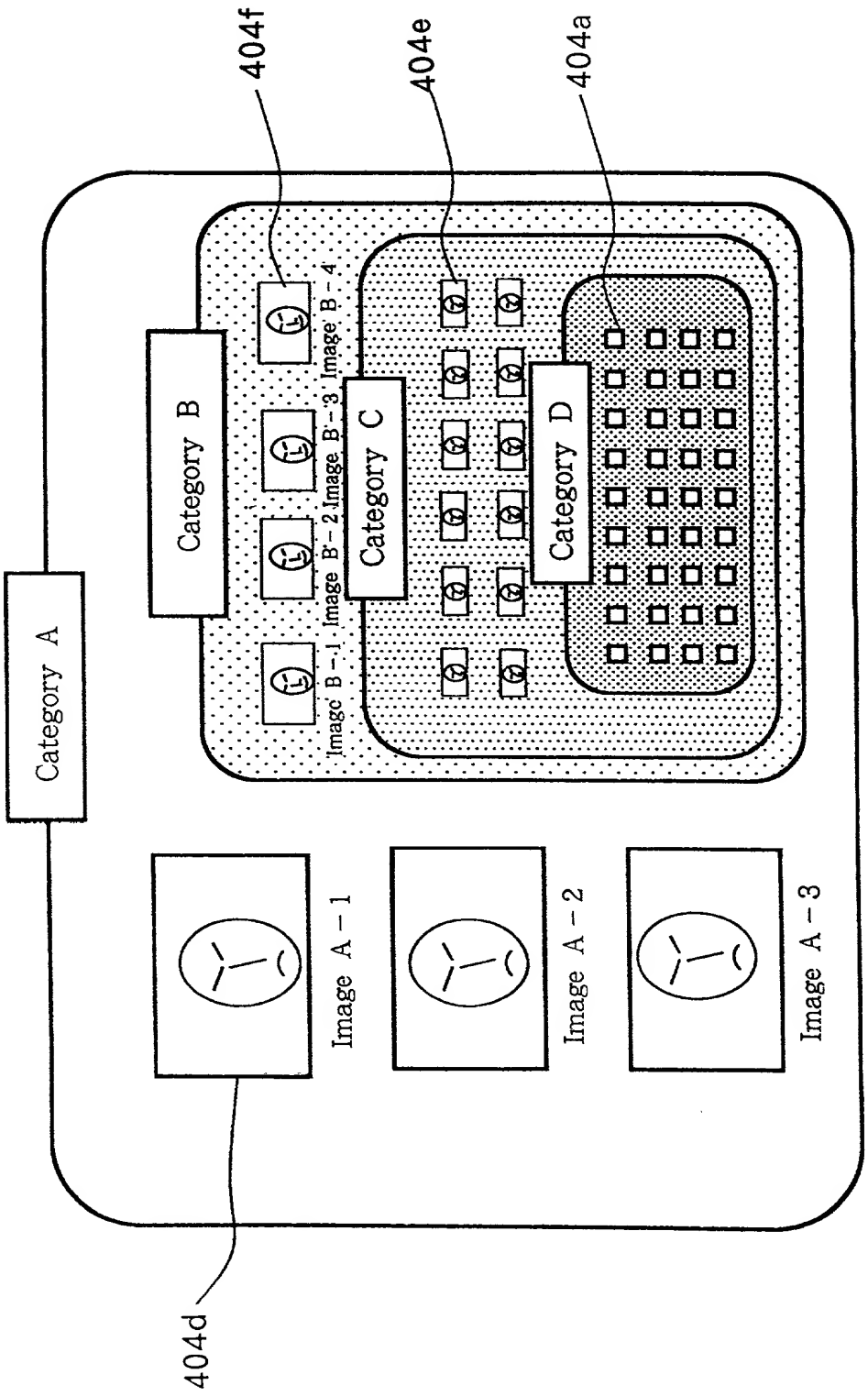

404f
404e
404a
Category A
Category B
Category C
Category D
Image B - 1
Image B - 2
Image B - 3
Image B - 4
Image A - 1
Image A - 2
Image A - 3
404d

FIG. 61

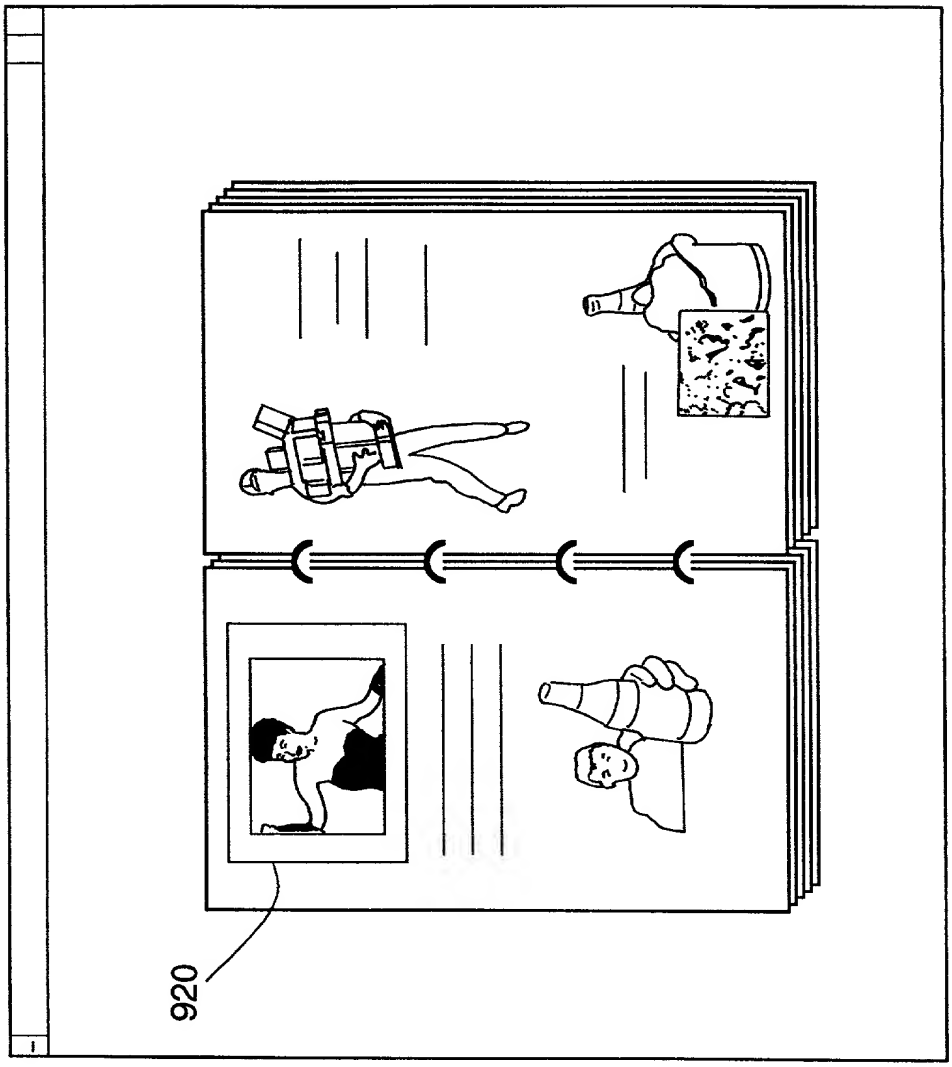


FIG. 62

FIG. 63

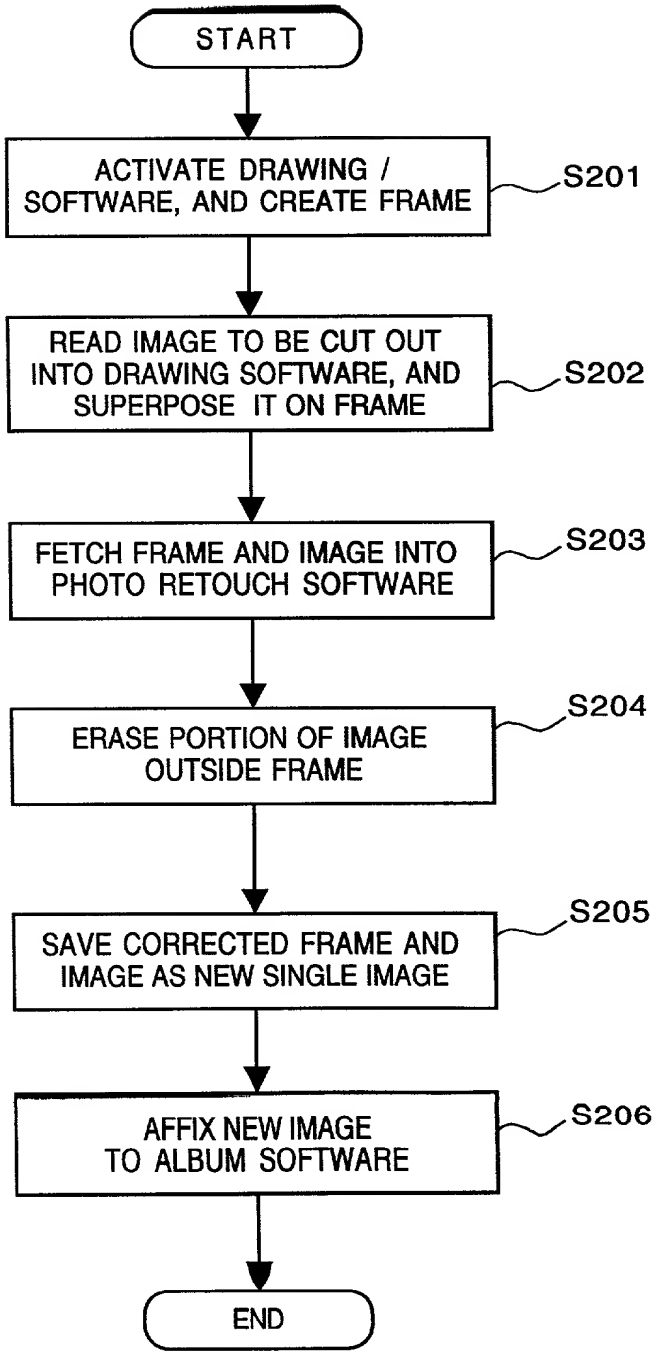

START
ACTIVATE DRAWING / SOFTWARE, AND CREATE FRAME
S201
READ IMAGE TO BE CUT OUT INTO DRAWING SOFTWARE, AND SUPERPOSE IT ON FRAME
S202
FETCH FRAME AND IMAGE INTO PHOTO RETOUCH SOFTWARE
S203
ERASE PORTION OF IMAGE OUTSIDE FRAME
S204
SAVE CORRECTED FRAME AND IMAGE AS NEW SINGLE IMAGE
S205
AFFIX NEW IMAGE TO ALBUM SOFTWARE
S206
END

FIG. 64

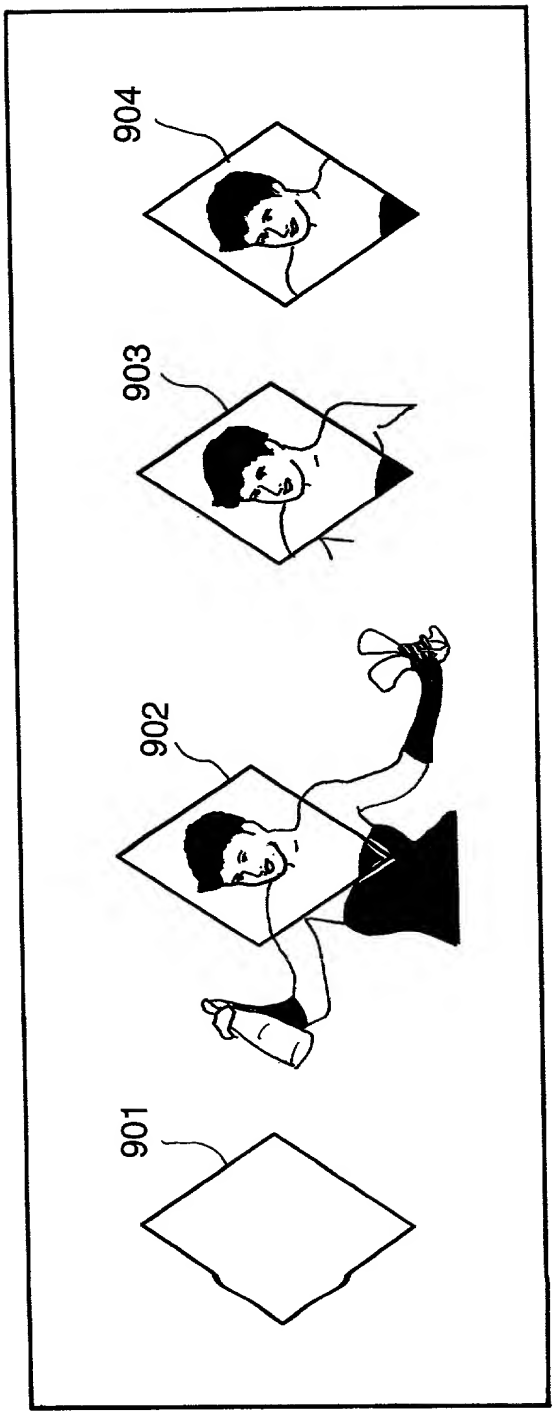


FIG. 65

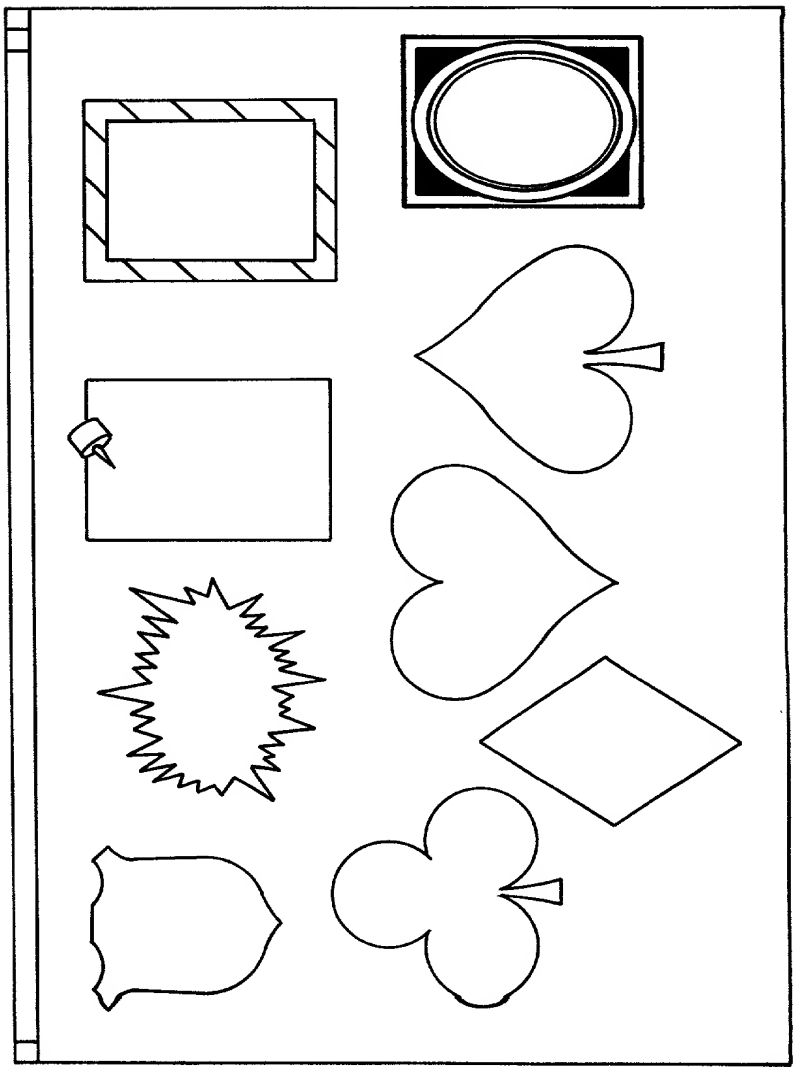


FIG. 66

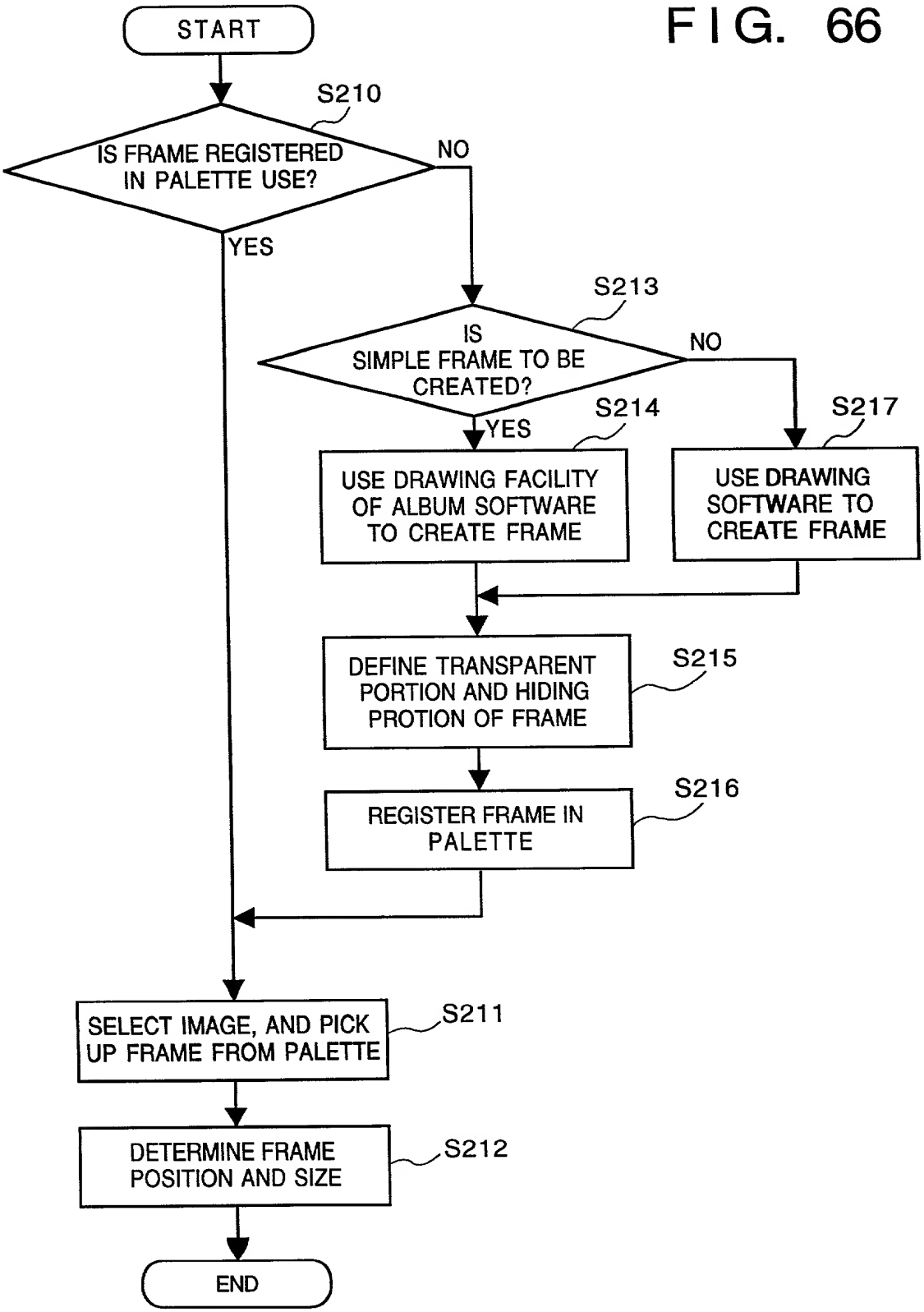

START
S210
IS FRAME REGISTERED IN PALETTE USE?
NO
YES
S213
IS SIMPLE FRAME TO BE CREATED?
NO
YES
S214
USE DRAWING FACILITY OF ALBUM SOFTWARE TO CREATE FRAME
S217
USE DRAWING SOFTWARE TO CREATE FRAME
DEFINE TRANSPARENT PORTION AND HIDING PROTION OF FRAME
S215
REGISTER FRAME IN PALETTE
S216
SELECT IMAGE, AND PICK UP FRAME FROM PALETTE
S211
DETERMINE FRAME POSITION AND SIZE
S212
END

FIG. 67

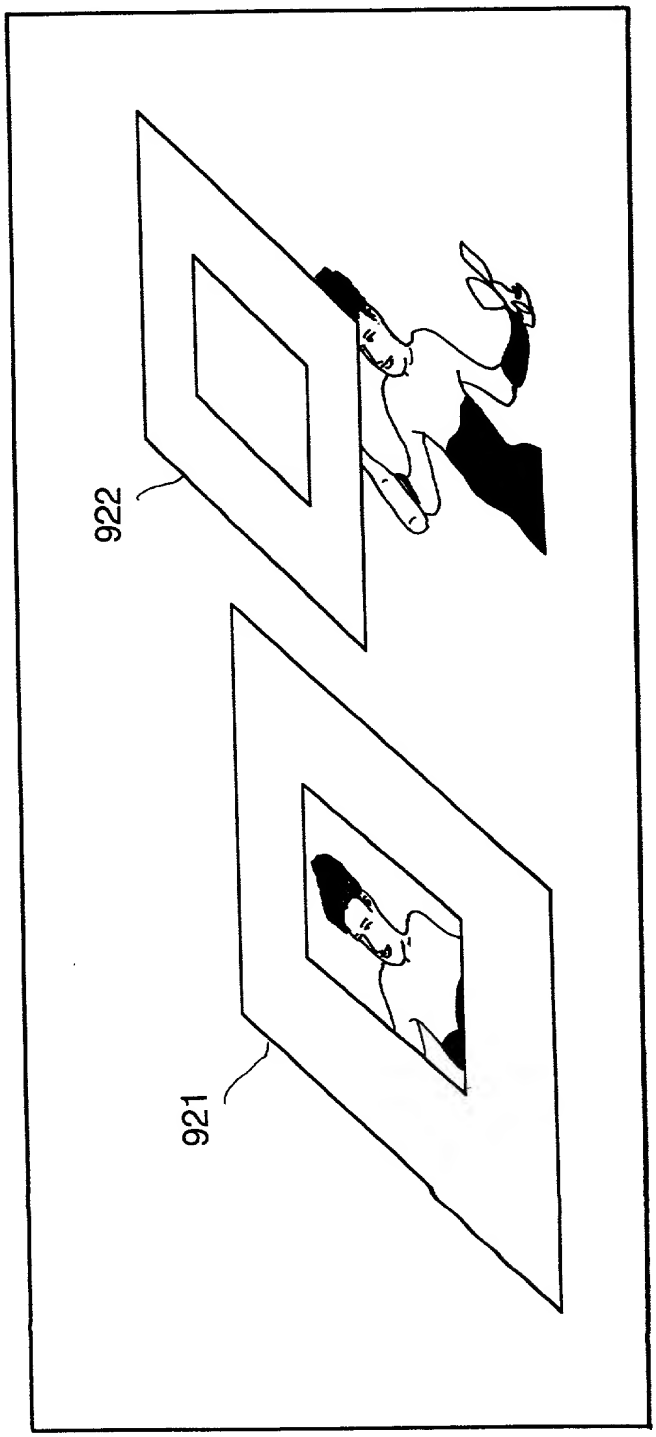


FIG. 68

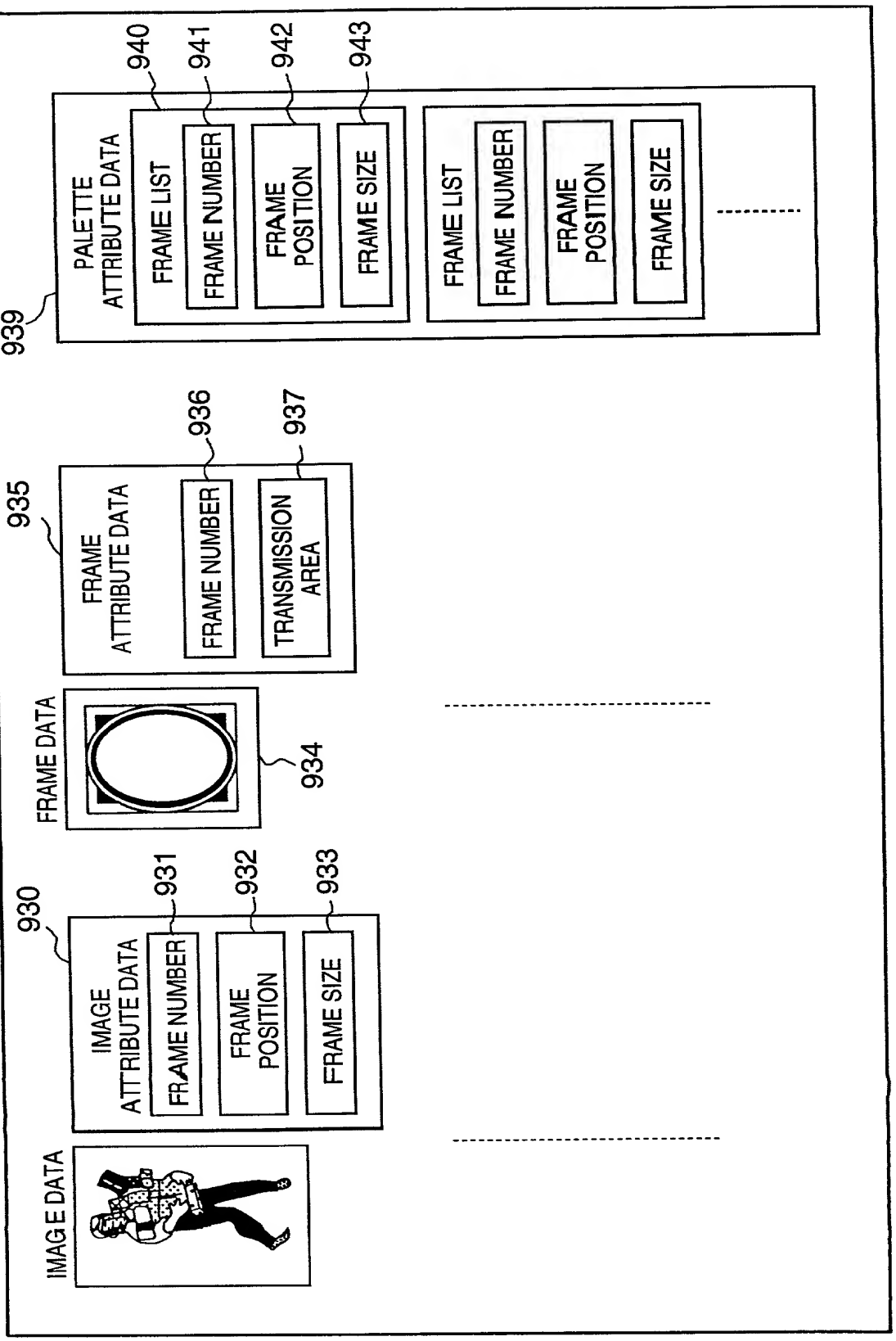

939
PALETTE ATTRIBUTE DATA
940
FRAME LIST
941
FRAME NUMBER
942
FRAME POSITION
943
FRAME SIZE
FRAME LIST
FRAME NUMBER
FRAME POSITION
FRAME SIZE
935
FRAME ATTRIBUTE DATA
936
FRAME NUMBER
937
TRANSMISSION AREA
FRAME DATA
934
930
IMAGE ATTRIBUTE DATA
931
FRAME NUMBER
932
FRAME POSITION
933
FRAME SIZE
IMAGE DATA

FIG. 69

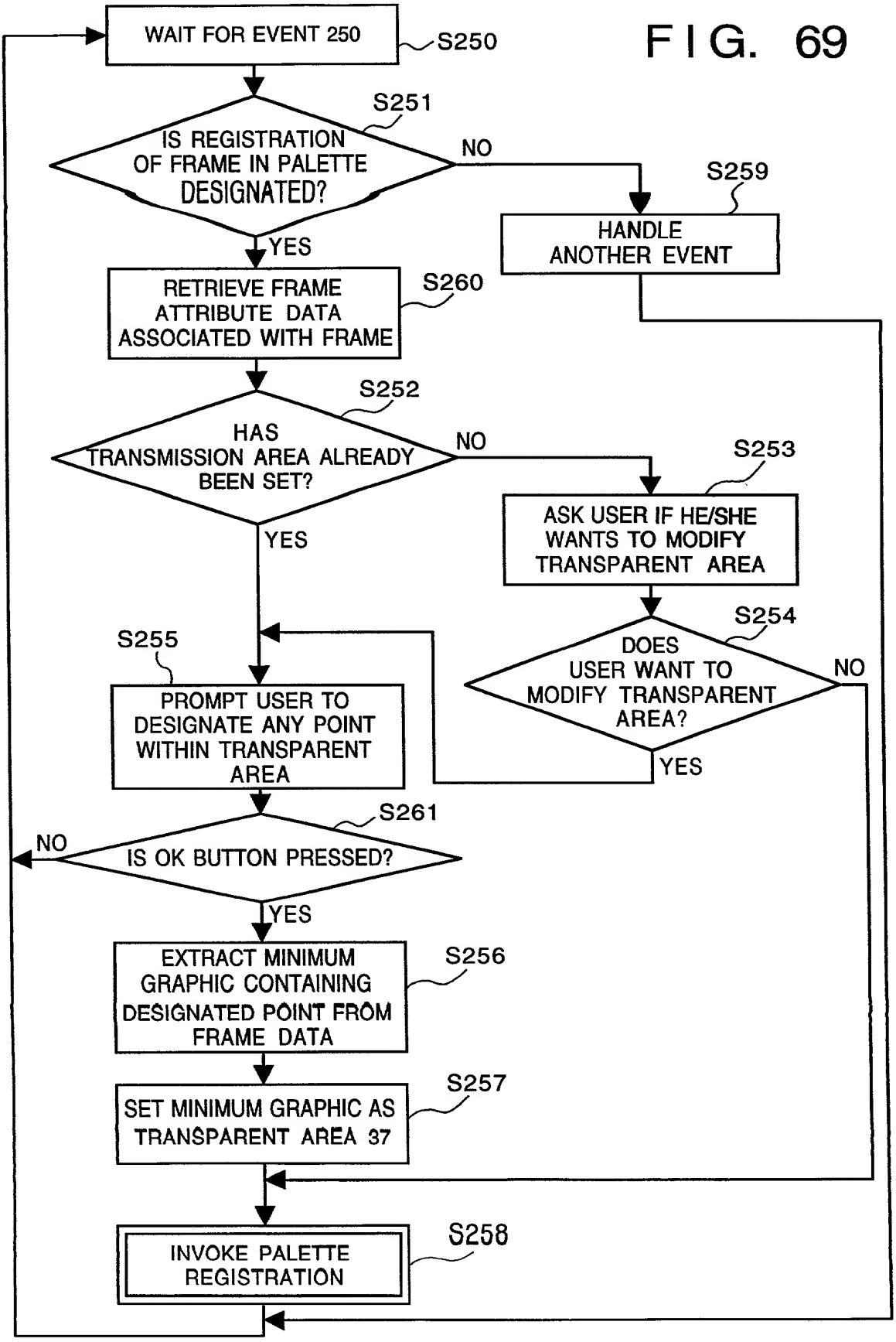

WAIT FOR EVENT 250
S250
S251
IS REGISTRATION OF FRAME IN PALETTE DESIGNATED?
NO
S259
HANDLE ANOTHER EVENT
YES
RETRIEVE FRAME ATTRIBUTE DATA ASSOCIATED WITH FRAME
S260
S252
HAS TRANSMISSION AREA ALREADY BEEN SET?
NO
S253
ASK USER IF HE/SHE WANTS TO MODIFY TRANSPARENT AREA
YES
S254
DOES USER WANT TO MODIFY TRANSPARENT AREA?
NO
S255
PROMPT USER TO DESIGNATE ANY POINT WITHIN TRANSPARENT AREA
YES
S261
NO
IS OK BUTTON PRESSED?
YES
EXTRACT MINIMUM GRAPHIC CONTAINING DESIGNATED POINT FROM FRAME DATA
S256
SET MINIMUM GRAPHIC AS TRANSPARENT AREA 37
S257
INVOKE PALETTE REGISTRATION
S258

FIG. 70

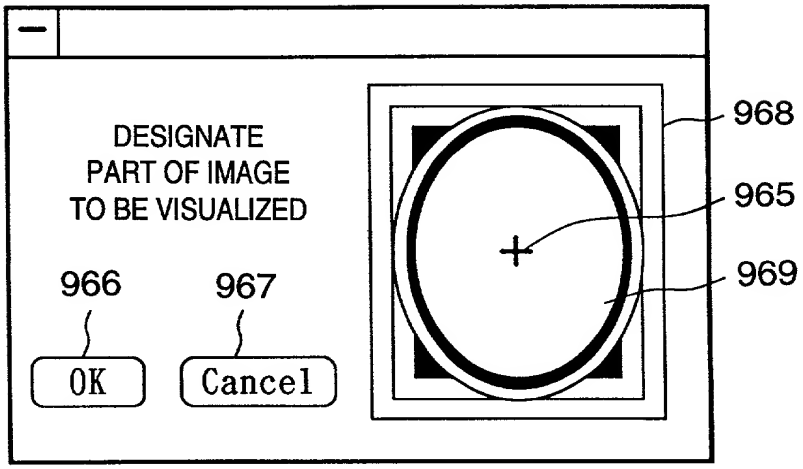

DESIGNATE
PART OF IMAGE
TO BE VISUALIZED
966
967
OK
Cancel
968
965
969

FIG. 71

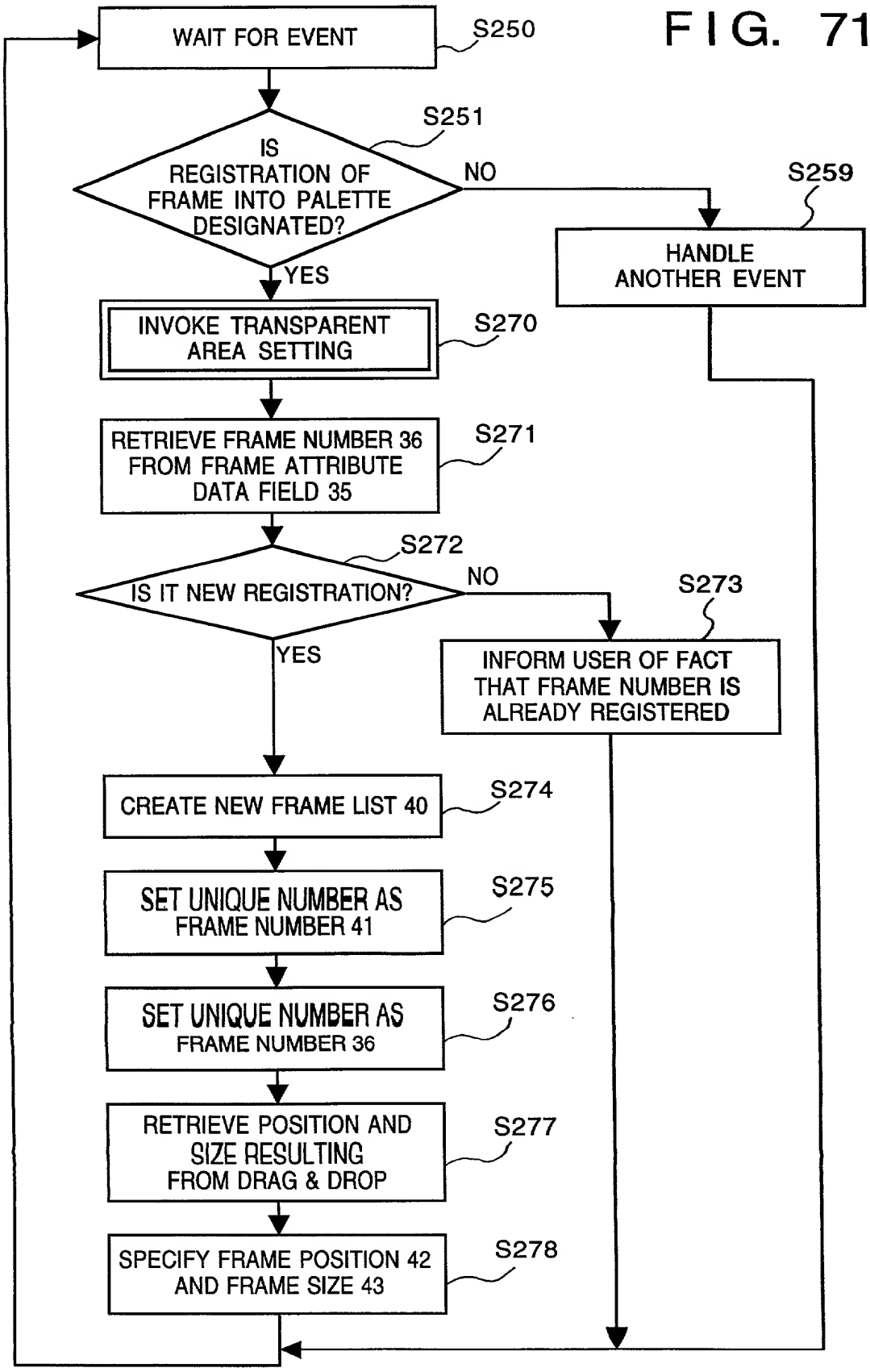

WAIT FOR EVENT
S250
IS REGISTRATION OF FRAME INTO PALETTE DESIGNATED?
S251
NO
S259
HANDLE ANOTHER EVENT
YES
INVOKE TRANSPARENT AREA SETTING
S270
RETRIEVE FRAME NUMBER 36 FROM FRAME ATTRIBUTE DATA FIELD 35
S271
IS IT NEW REGISTRATION?
S272
NO
S273
INFORM USER OF FACT THAT FRAME NUMBER IS ALREADY REGISTERED
YES
CREATE NEW FRAME LIST 40
S274
SET UNIQUE NUMBER AS FRAME NUMBER 41
S275
SET UNIQUE NUMBER AS FRAME NUMBER 36
S276
RETRIEVE POSITION AND SIZE RESULTING FROM DRAG & DROP
S277
SPECIFY FRAME POSITION 42 AND FRAME SIZE 43
S278

FIG. 72A

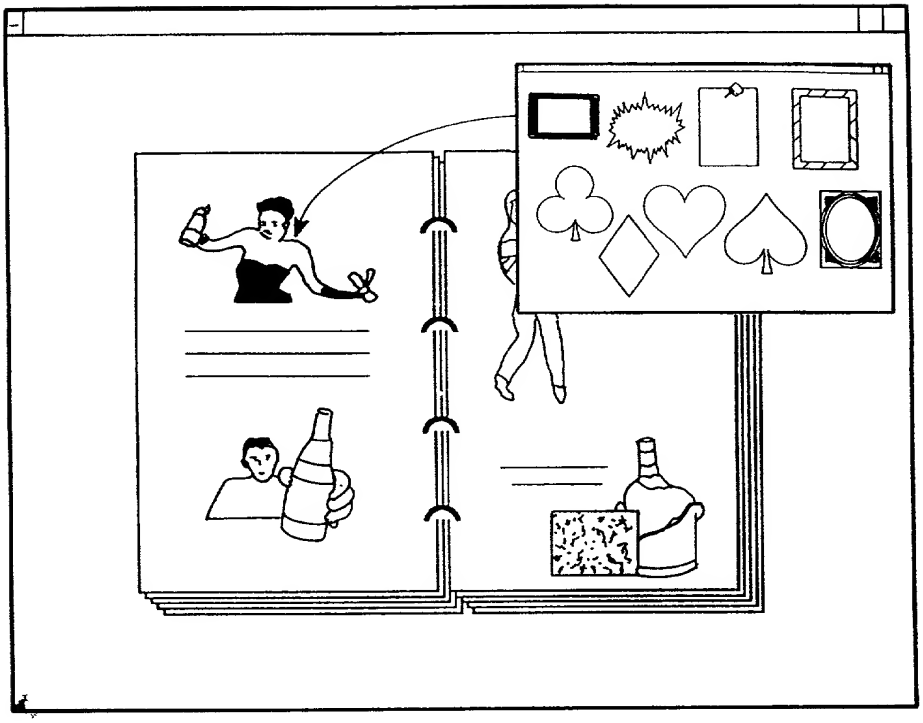


FIG. 72B

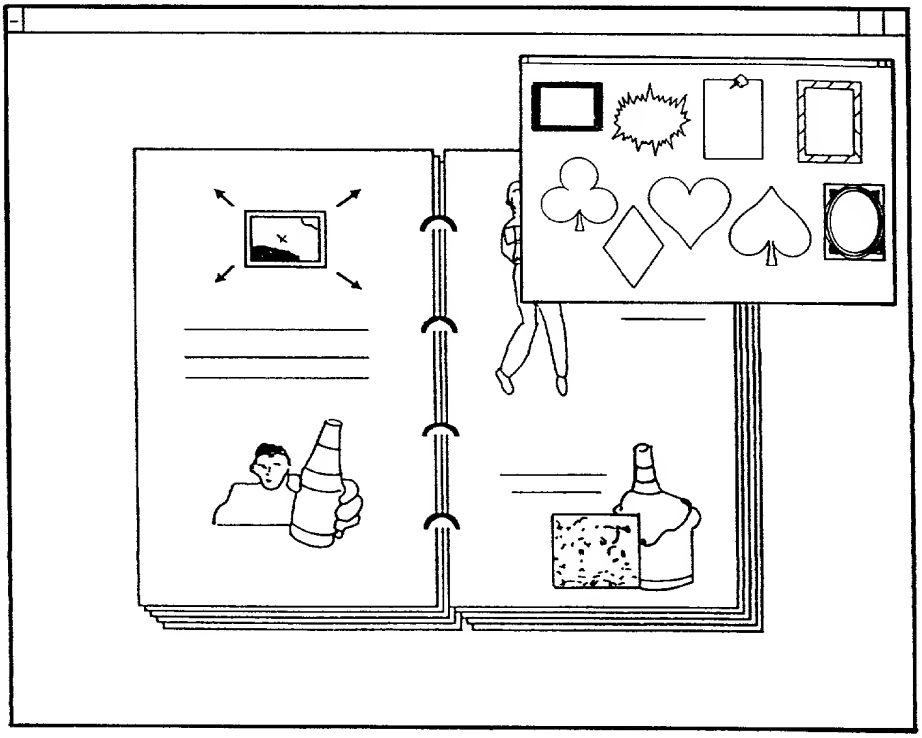


FIG. 73

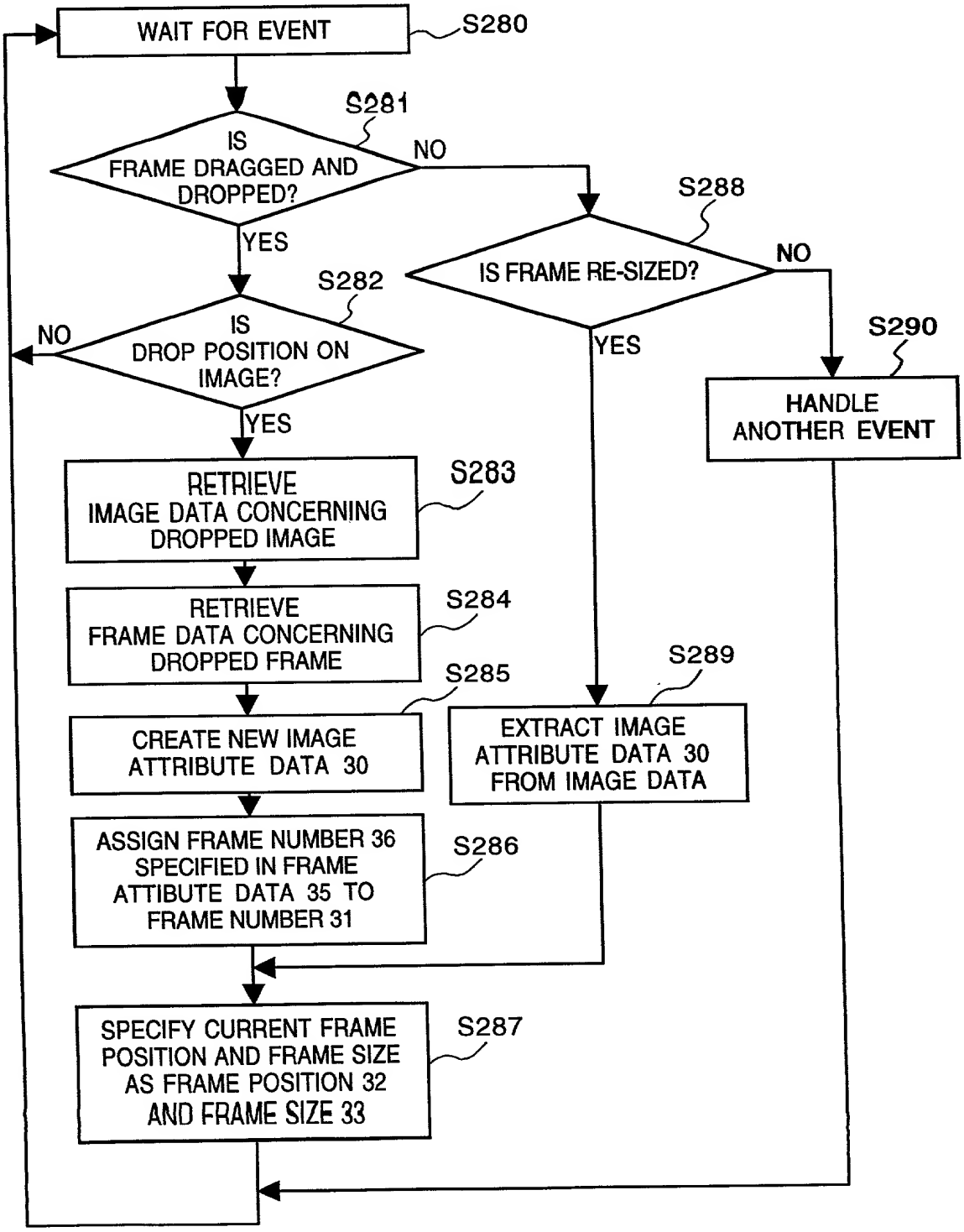

WAIT FOR EVENT
S280
S281
IS FRAME DRAGGED AND DROPPED?
NO
YES
S288
IS FRAME RE-SIZED?
NO
YES
S282
IS DROP POSITION ON IMAGE?
NO
YES
S290
HANDLE ANOTHER EVENT
RETRIEVE IMAGE DATA CONCERNING DROPPED IMAGE
S283
RETRIEVE FRAME DATA CONCERNING DROPPED FRAME
S284
S285
S289
CREATE NEW IMAGE ATTRIBUTE DATA 30
EXTRACT IMAGE ATTRIBUTE DATA 30 FROM IMAGE DATA
ASSIGN FRAME NUMBER 36 SPECIFIED IN FRAME ATTIBUTE DATA 35 TO FRAME NUMBER 31
S286
SPECIFY CURRENT FRAME POSITION AND FRAME SIZE AS FRAME POSITION 32 AND FRAME SIZE 33
S287

FIG. 74

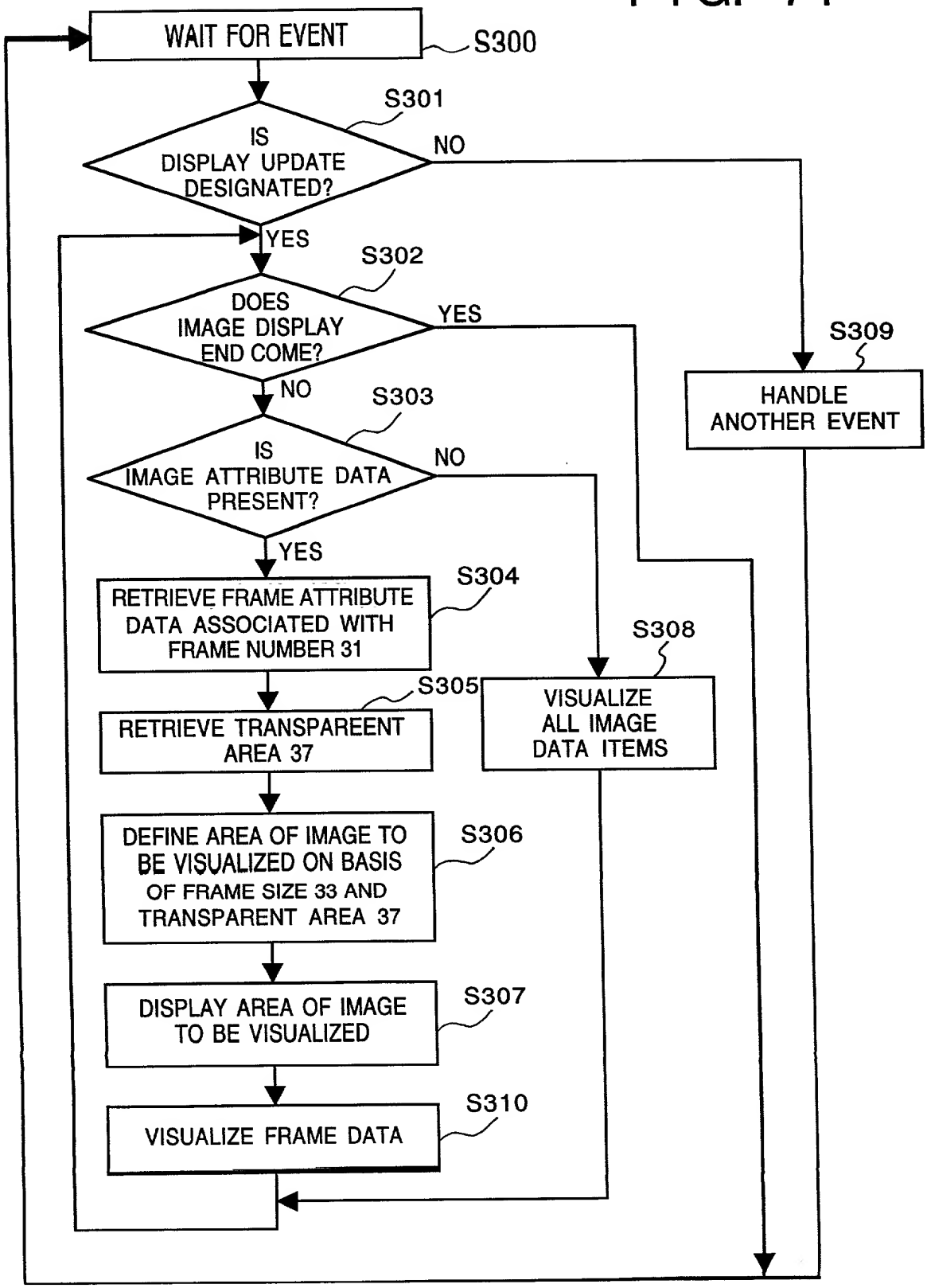

WAIT FOR EVENT
S300
S301
IS DISPLAY UPDATE DESIGNATED?
NO
YES
S302
DOES IMAGE DISPLAY END COME?
YES
NO
S303
IS IMAGE ATTRIBUTE DATA PRESENT?
NO
YES
S309
HANDLE ANOTHER EVENT
S304
RETRIEVE FRAME ATTRIBUTE DATA ASSOCIATED WITH FRAME NUMBER 31
S308
VISUALIZE ALL IMAGE DATA ITEMS
S305
RETRIEVE TRANSPAREENT AREA 37
S306
DEFINE AREA OF IMAGE TO BE VISUALIZED ON BASIS OF FRAME SIZE 33 AND TRANSPARENT AREA 37
S307
DISPLAY AREA OF IMAGE TO BE VISUALIZED
S310
VISUALIZE FRAME DATA

FIG. 75

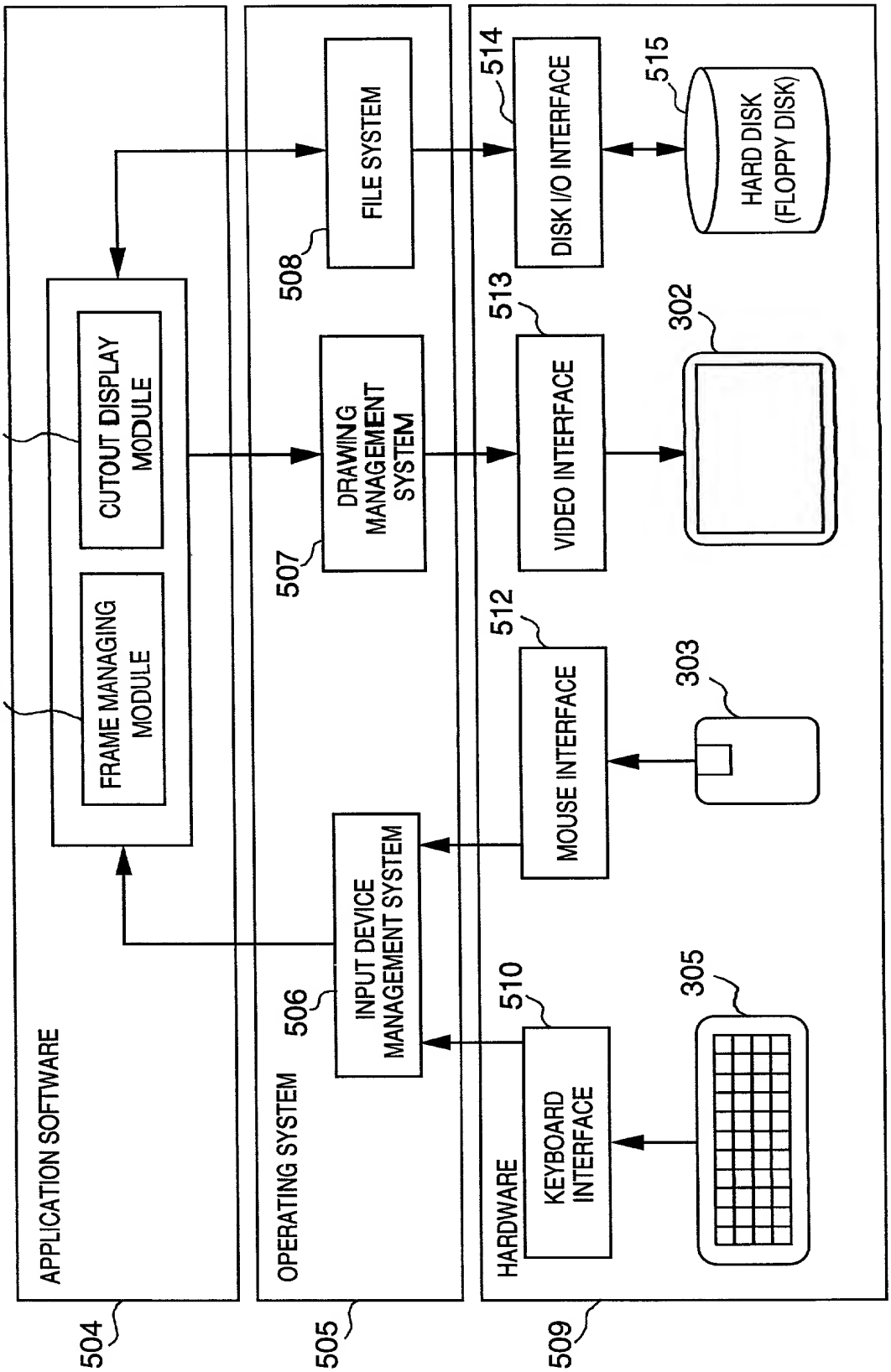

APPLICATION SOFTWARE
504
2503
CUTOUT DISPLAY MODULE
2502
FRAME MANAGING MODULE
OPERATING SYSTEM
505
506
INPUT DEVICE MANAGEMENT SYSTEM
507
DRAWING MANAGEMENT SYSTEM
508
FILE SYSTEM
HARDWARE
509
510
KEYBOARD INTERFACE
512
MOUSE INTERFACE
513
VIDEO INTERFACE
514
DISK I/O INTERFACE
515
HARD DISK (FLOPPY DISK)
302
303
305

FIG. 76A

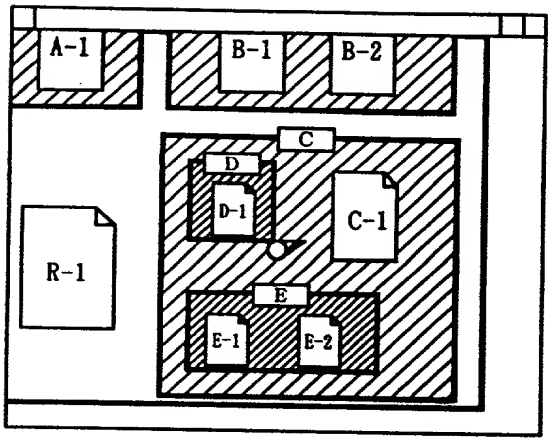


FIG. 76B

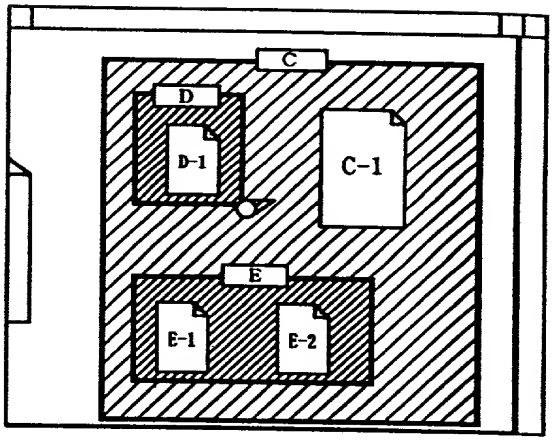


FIG. 76C

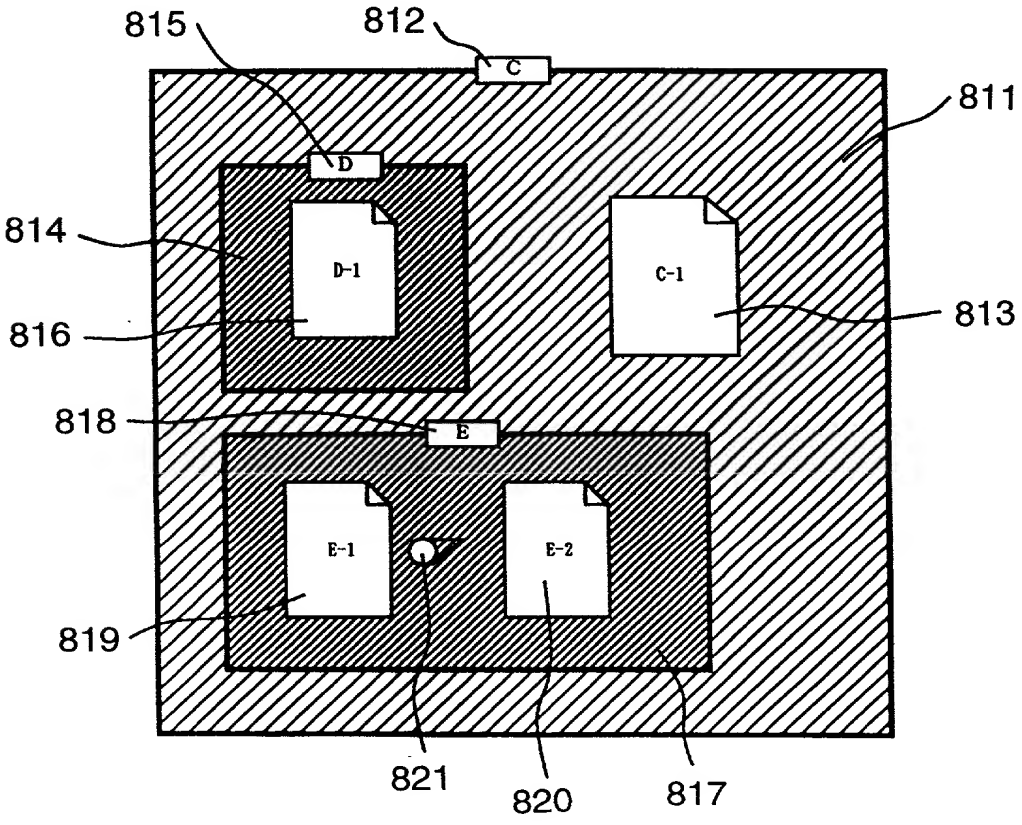


FIG. 77A

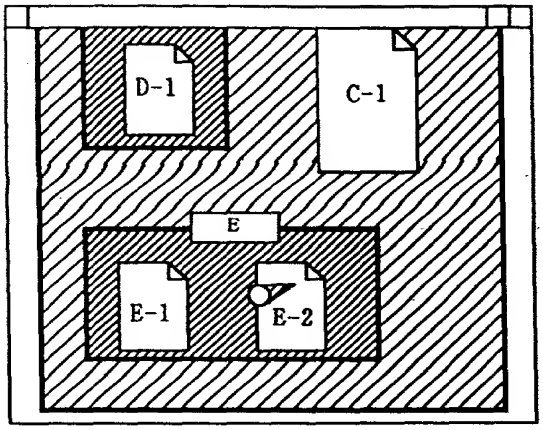


FIG. 77B

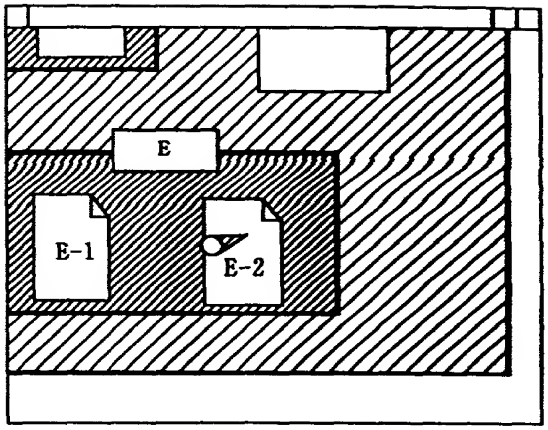


FIG. 77C

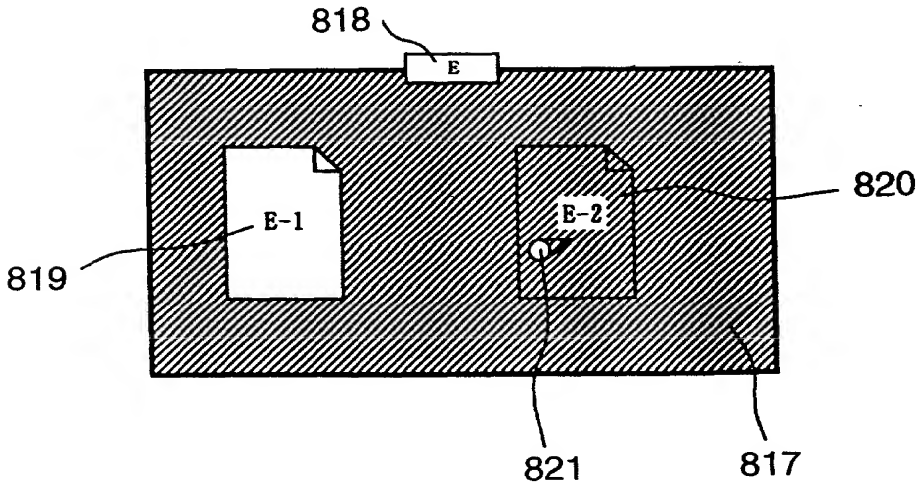


FIG. 78

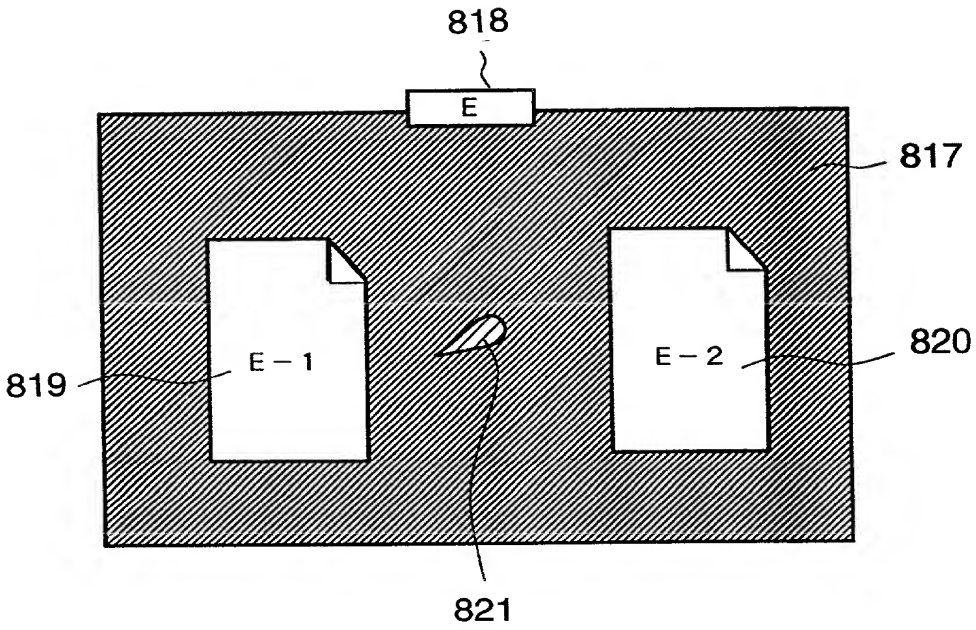


FIG. 79

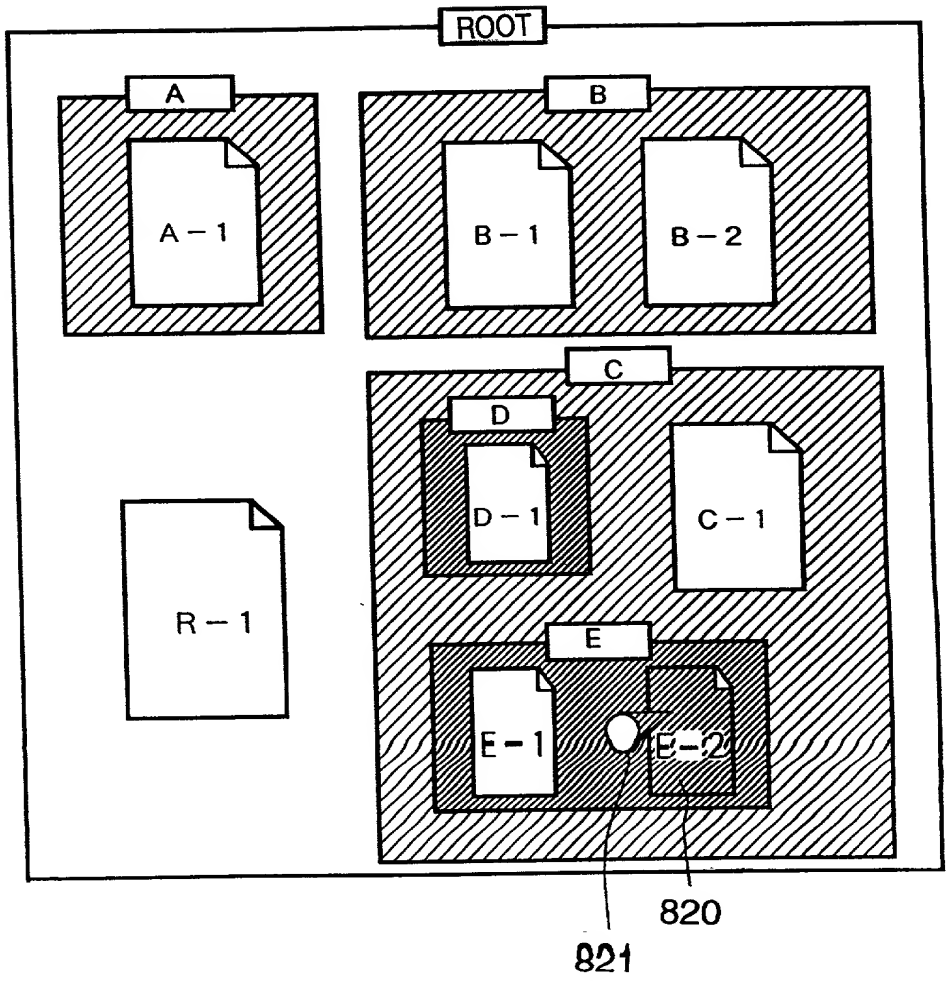


FIG. 80

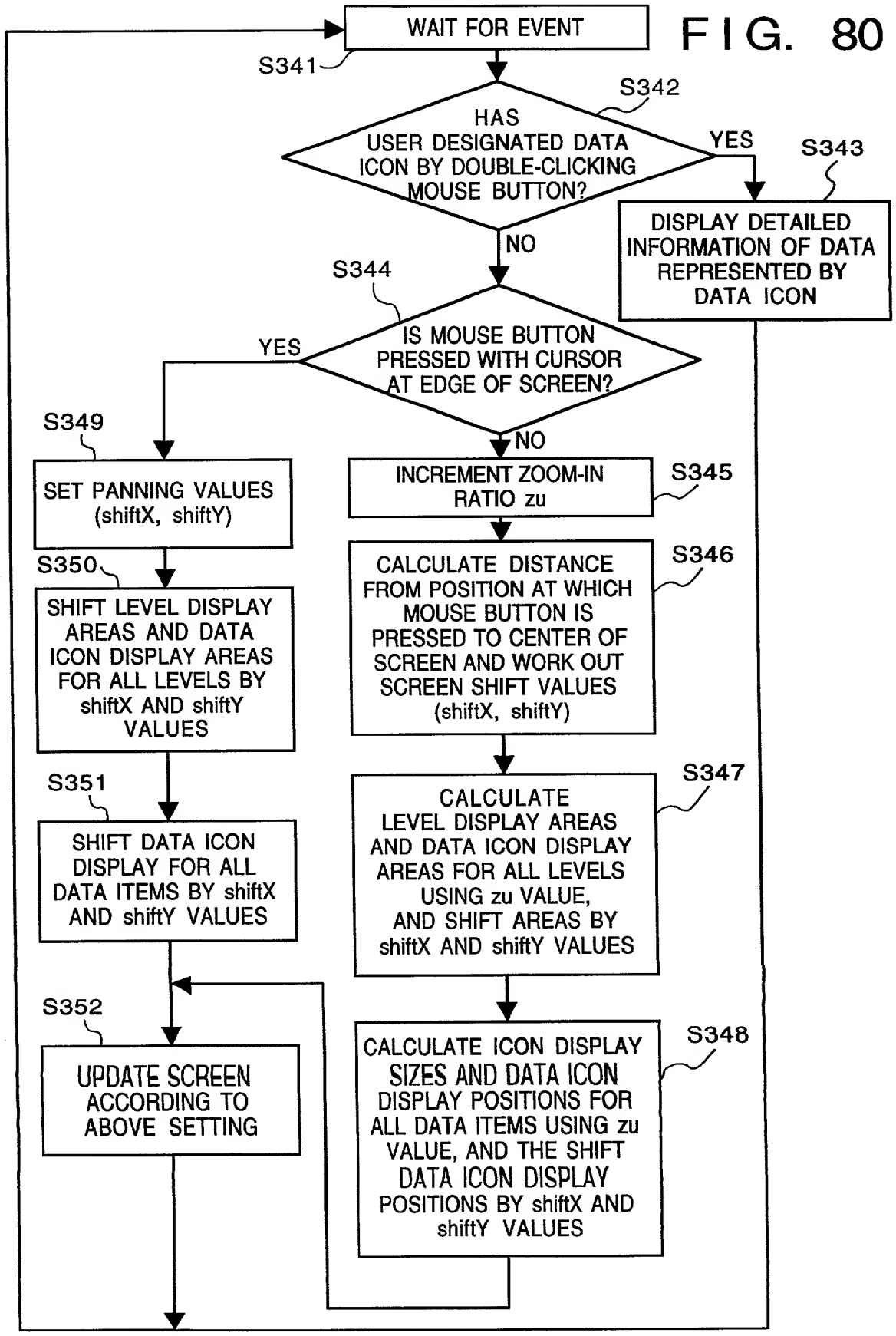

WAIT FOR EVENT
S341
S342
HAS USER DESIGNATED DATA ICON BY DOUBLE-CLICKING MOUSE BUTTON?
YES
S343
DISPLAY DETAILED INFORMATION OF DATA REPRESENTED BY DATA ICON
NO
S344
IS MOUSE BUTTON PRESSED WITH CURSOR AT EDGE OF SCREEN?
YES
NO
S349
SET PANNING VALUES (shiftX, shiftY)
S350
SHIFT LEVEL DISPLAY AREAS AND DATA ICON DISPLAY AREAS FOR ALL LEVELS BY shiftX AND shiftY VALUES
S351
SHIFT DATA ICON DISPLAY FOR ALL DATA ITEMS BY shiftX AND shiftY VALUES
S352
UPDATE SCREEN ACCORDING TO ABOVE SETTING
INCREMENT ZOOM-IN RATIO zu
S345
CALCULATE DISTANCE FROM POSITION AT WHICH MOUSE BUTTON IS PRESSED TO CENTER OF SCREEN AND WORK OUT SCREEN SHIFT VALUES (shiftX, shiftY)
S346
CALCULATE LEVEL DISPLAY AREAS AND DATA ICON DISPLAY AREAS FOR ALL LEVELS USING zu VALUE, AND SHIFT AREAS BY shiftX AND shiftY VALUES
S347
CALCULATE ICON DISPLAY SIZES AND DATA ICON DISPLAY POSITIONS FOR ALL DATA ITEMS USING zu VALUE, AND THE SHIFT DATA ICON DISPLAY POSITIONS BY shiftX AND shiftY VALUES
S348

FIG. 81

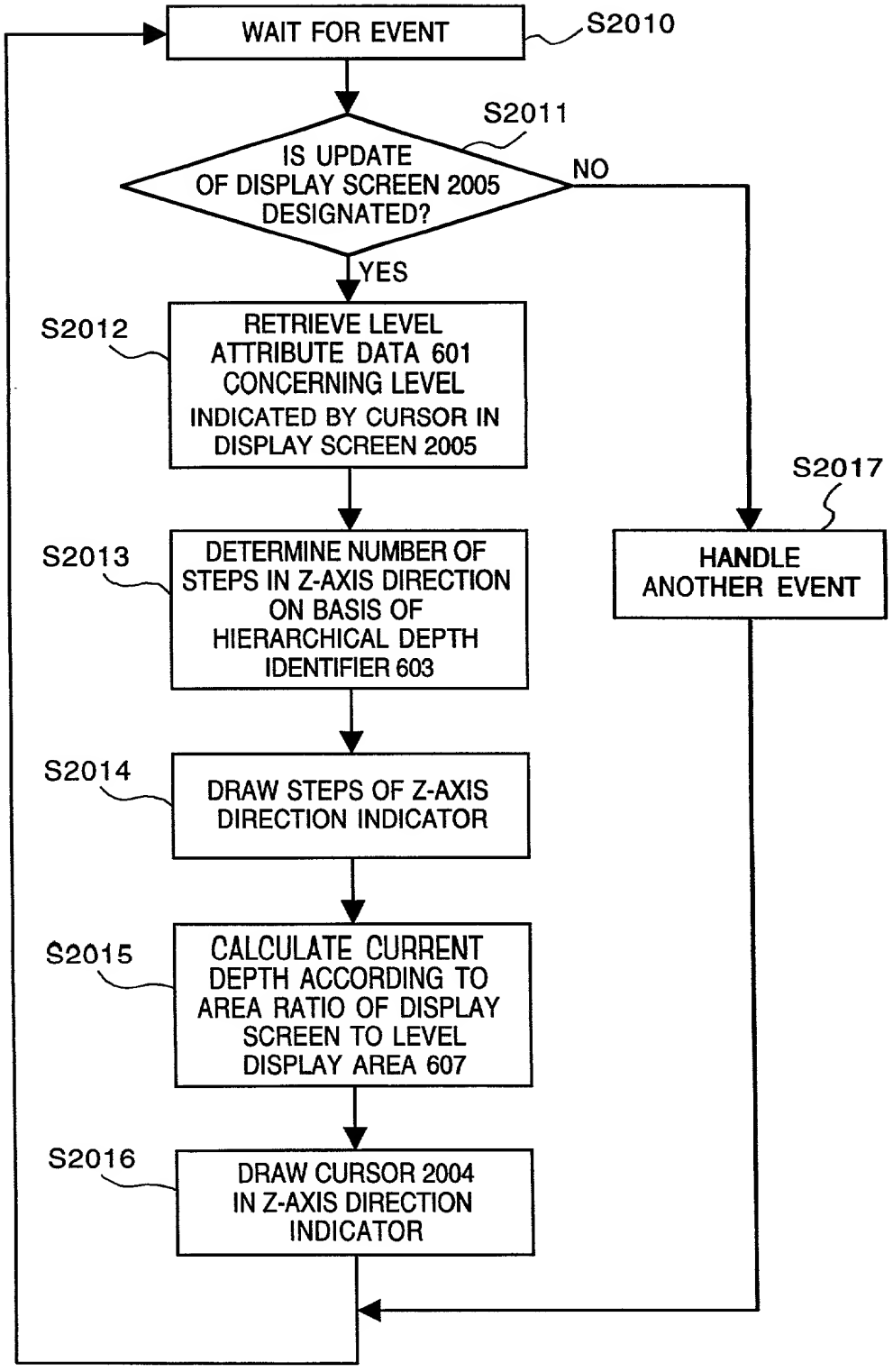
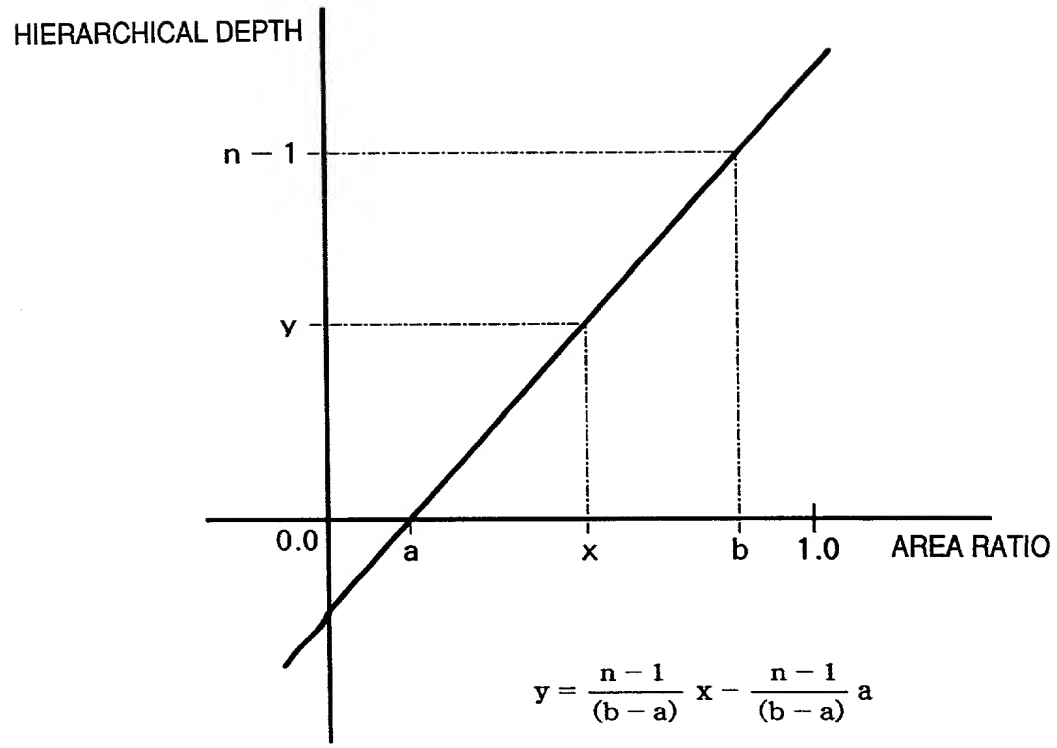

WAIT FOR EVENT
S2010
S2011
IS UPDATE OF DISPLAY SCREEN 2005 DESIGNATED?
NO
YES
S2012
RETRIEVE LEVEL ATTRIBUTE DATA 601 CONCERNING LEVEL INDICATED BY CURSOR IN DISPLAY SCREEN 2005
S2013
DETERMINE NUMBER OF STEPS IN Z-AXIS DIRECTION ON BASIS OF HIERARCHICAL DEPTH IDENTIFIER 603
S2014
DRAW STEPS OF Z-AXIS DIRECTION INDICATOR
S2015
CALCULATE CURRENT DEPTH ACCORDING TO AREA RATIO OF DISPLAY SCREEN TO LEVEL DISPLAY AREA 607
S2016
DRAW CURSOR 2004 IN Z-AXIS DIRECTION INDICATOR
S2017
HANDLE ANOTHER EVENT

FIG. 82



$$y = \frac{n-1}{(b-a)}\,x - \frac{n-1}{(b-a)}\,a$$

FIG. 83A

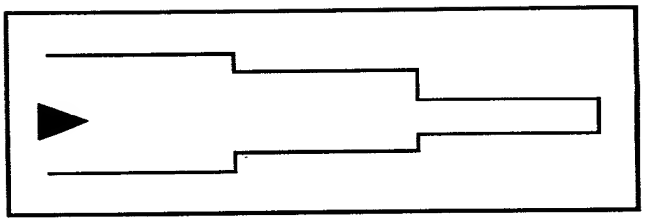


FIG. 83B

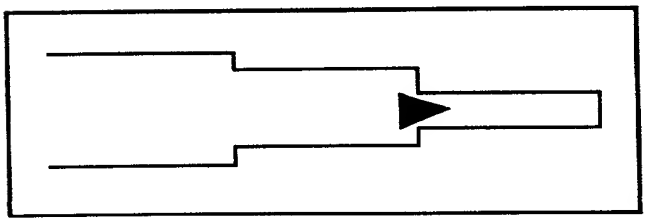


FIG. 84

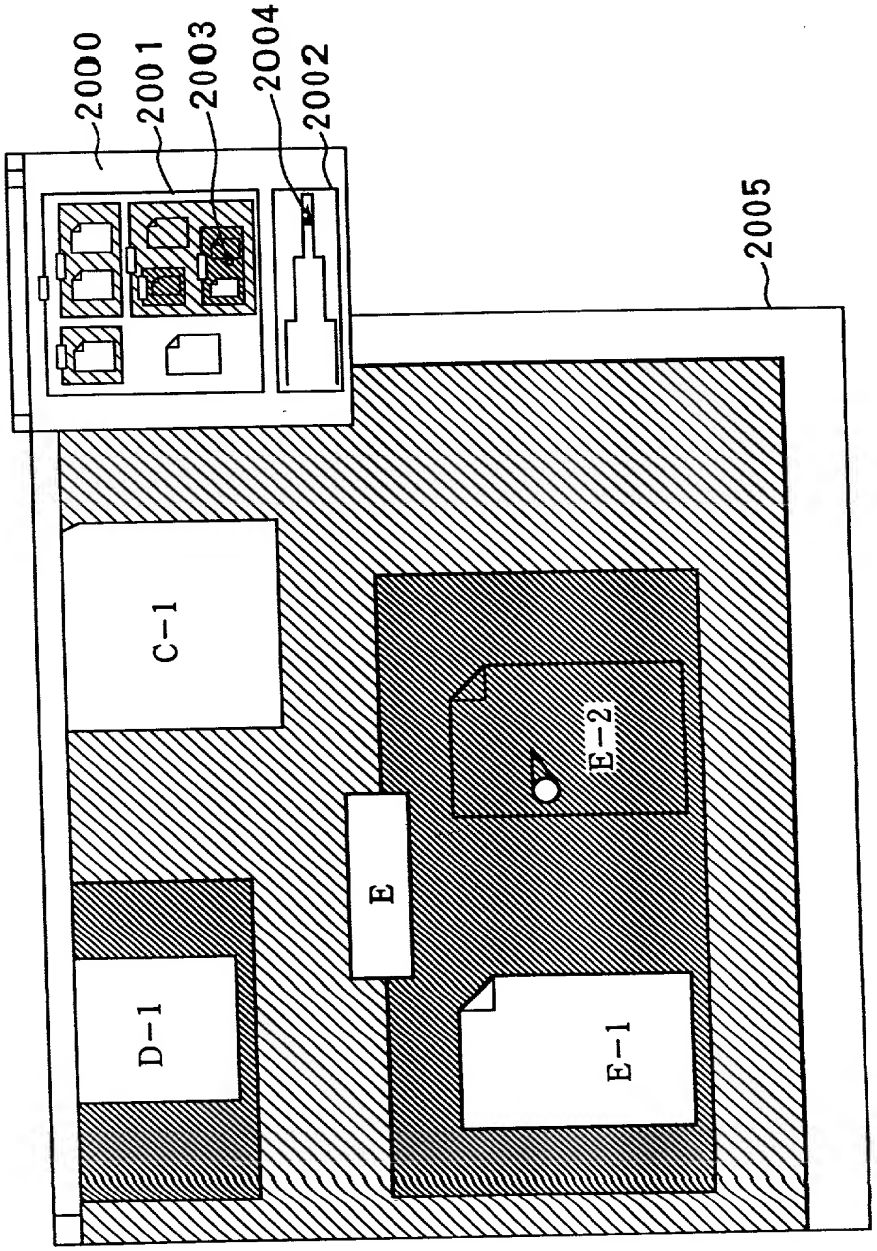


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FIG. 85A

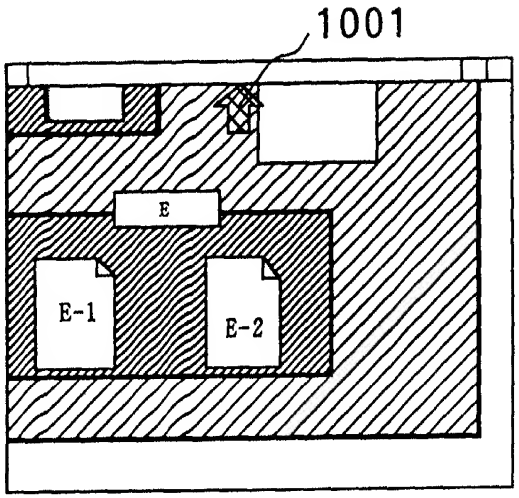


FIG. 85B

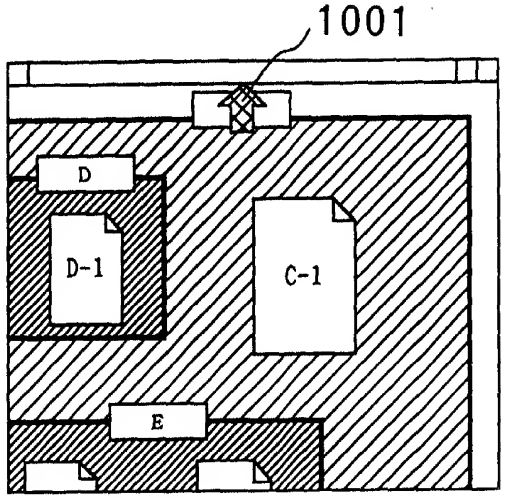


FIG. 86

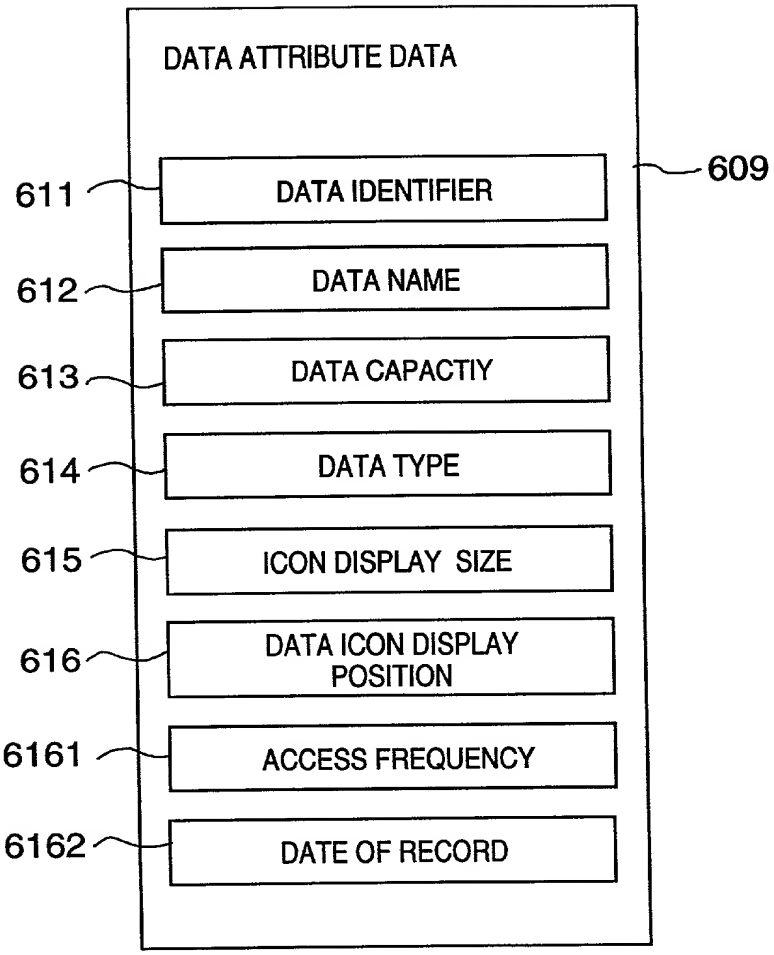

DATA ATTRIBUTE DATA
609
611
DATA IDENTIFIER
612
DATA NAME
613
DATA CAPACTIY
614
DATA TYPE
615
ICON DISPLAY SIZE
616
DATA ICON DISPLAY POSITION
6161
ACCESS FREQUENCY
6162
DATE OF RECORD

FIG. 87B

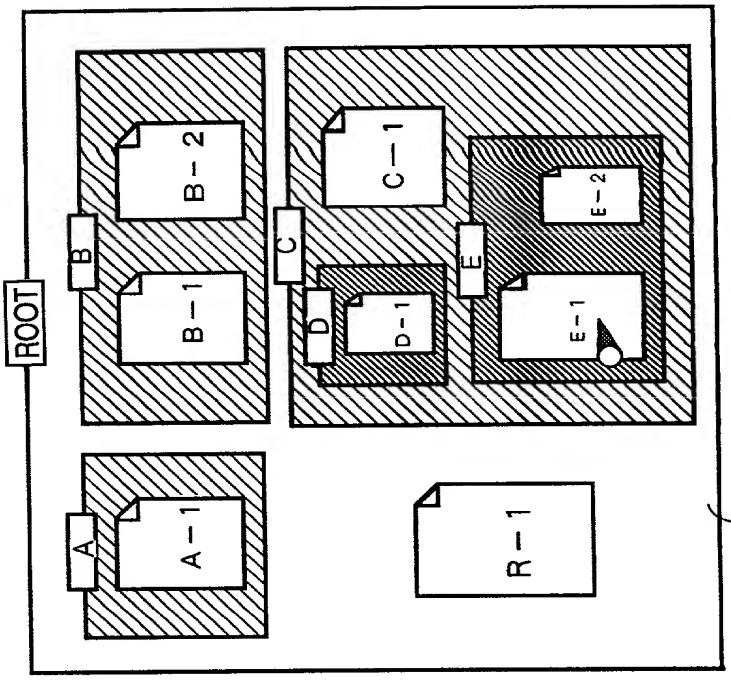


FIG. 87A

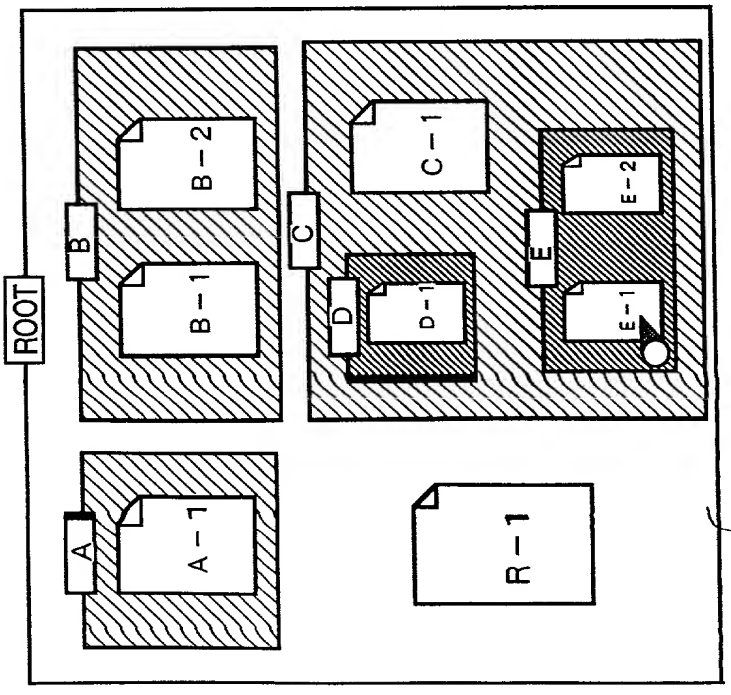


FIG. 88

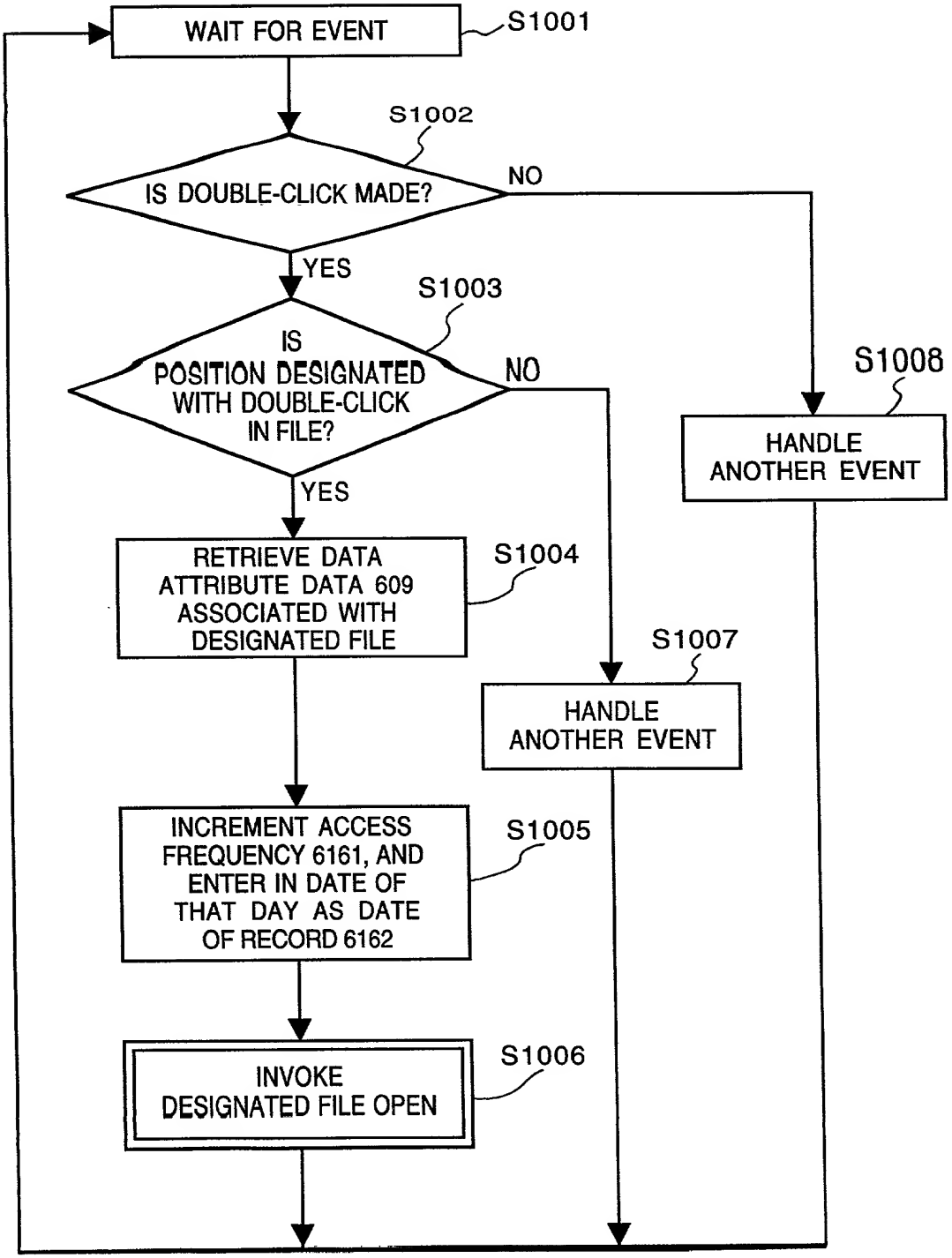

WAIT FOR EVENT
S1001
S1002
IS DOUBLE-CLICK MADE?
NO
YES
S1003
IS POSITION DESIGNATED WITH DOUBLE-CLICK IN FILE?
NO
YES
S1008
HANDLE ANOTHER EVENT
RETRIEVE DATA ATTRIBUTE DATA 609 ASSOCIATED WITH DESIGNATED FILE
S1004
S1007
HANDLE ANOTHER EVENT
INCREMENT ACCESS FREQUENCY 6161, AND ENTER IN DATE OF THAT DAY AS DATE OF RECORD 6162
S1005
INVOKE DESIGNATED FILE OPEN
S1006

FIG. 89

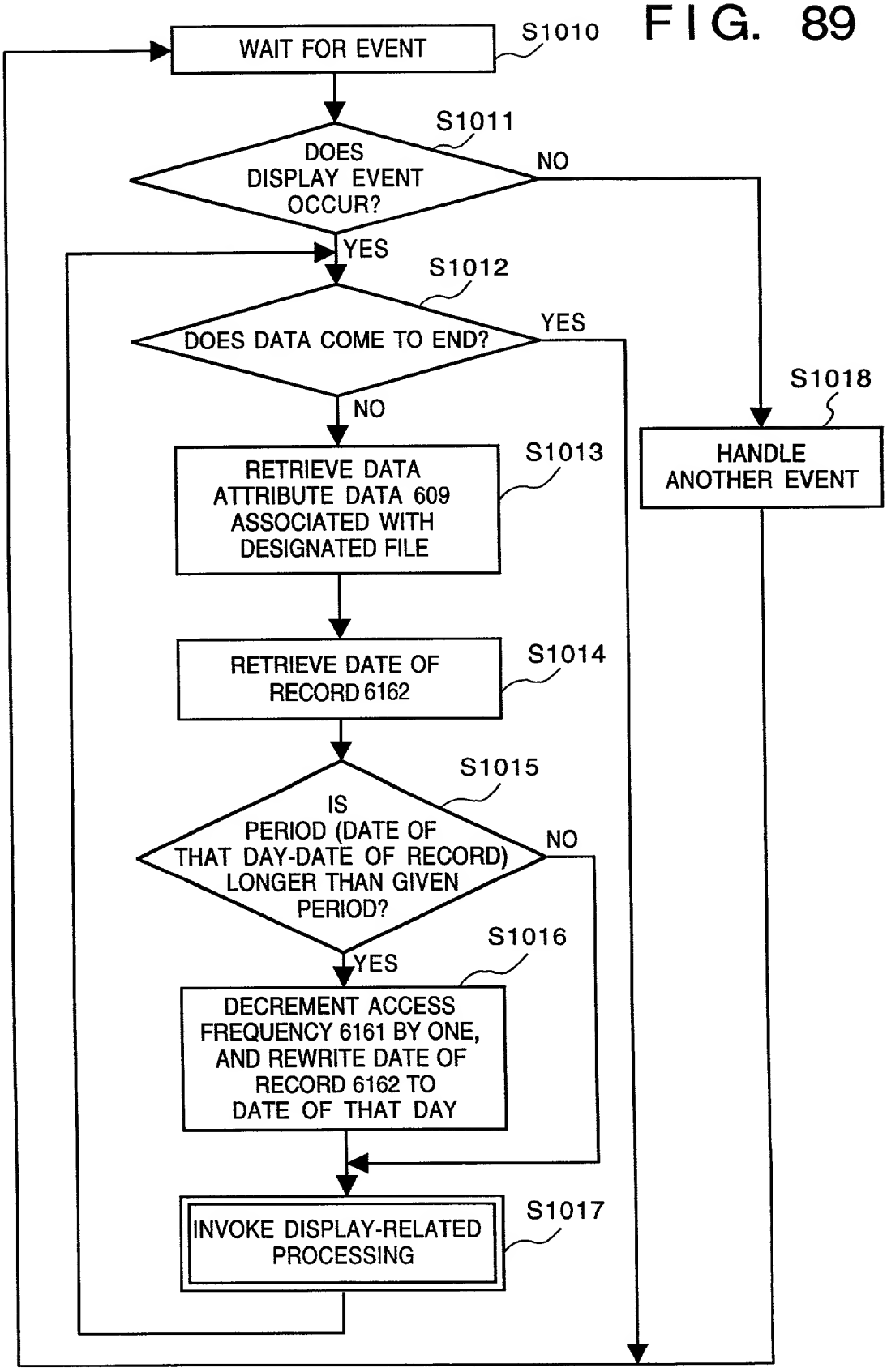

WAIT FOR EVENT
S1010
S1011
DOES DISPLAY EVENT OCCUR?
NO
YES
S1012
DOES DATA COME TO END?
YES
NO
S1018
HANDLE ANOTHER EVENT
S1013
RETRIEVE DATA ATTRIBUTE DATA 609 ASSOCIATED WITH DESIGNATED FILE
S1014
RETRIEVE DATE OF RECORD 6162
S1015
IS PERIOD (DATE OF THAT DAY-DATE OF RECORD) LONGER THAN GIVEN PERIOD?
NO
YES
S1016
DECREMENT ACCESS FREQUENCY 6161 BY ONE, AND REWRITE DATE OF RECORD 6162 TO DATE OF THAT DAY
S1017
INVOKE DISPLAY-RELATED PROCESSING

FIG. 90

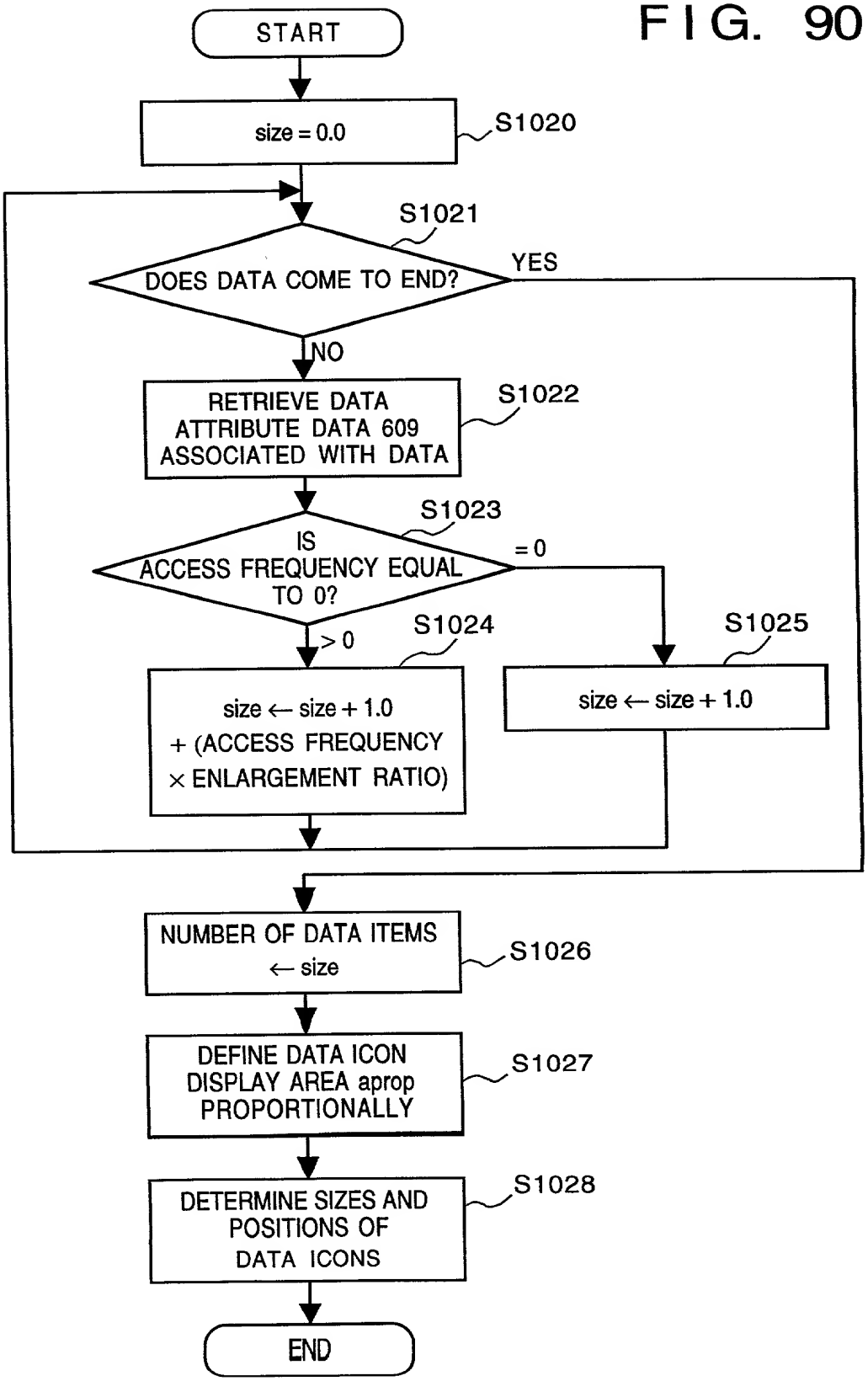

START
size = 0.0
S1020
S1021
DOES DATA COME TO END?
YES
NO
RETRIEVE DATA ATTRIBUTE DATA 609 ASSOCIATED WITH DATA
S1022
S1023
IS ACCESS FREQUENCY EQUAL TO 0?
= 0
> 0
S1024
size ← size + 1.0 + (ACCESS FREQUENCY × ENLARGEMENT RATIO)
S1025
size ← size + 1.0
NUMBER OF DATA ITEMS ← size
S1026
DEFINE DATA ICON DISPLAY AREA aprop PROPORTIONALLY
S1027
DETERMINE SIZES AND POSITIONS OF DATA ICONS
S1028
END

FIG. 91

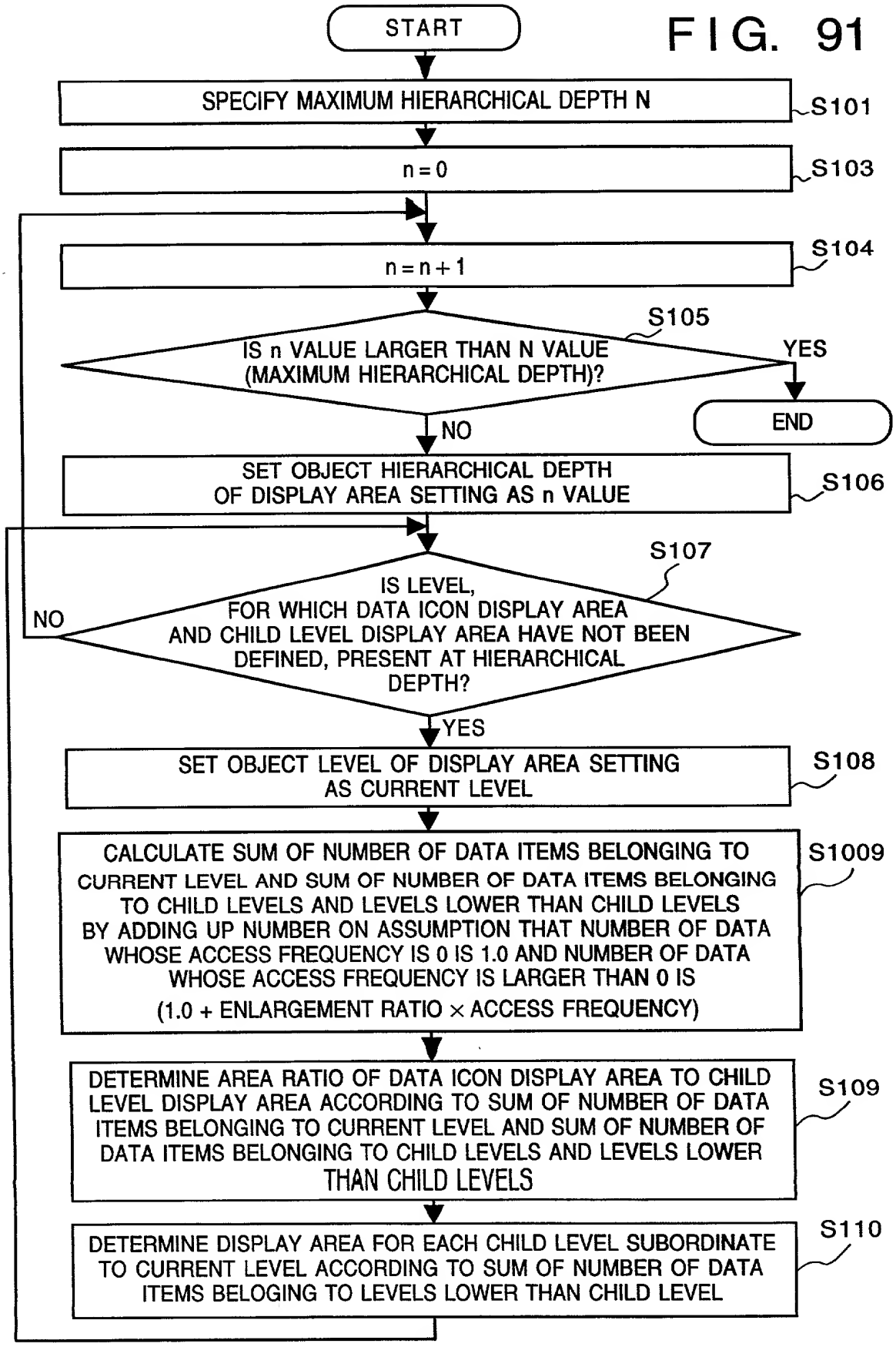

START
SPECIFY MAXIMUM HIERARCHICAL DEPTH N
S101
n = 0
S103
n = n + 1
S104
S105
IS n VALUE LARGER THAN N VALUE (MAXIMUM HIERARCHICAL DEPTH)?
YES
END
NO
SET OBJECT HIERARCHICAL DEPTH OF DISPLAY AREA SETTING AS n VALUE
S106
S107
IS LEVEL, FOR WHICH DATA ICON DISPLAY AREA AND CHILD LEVEL DISPLAY AREA HAVE NOT BEEN DEFINED, PRESENT AT HIERARCHICAL DEPTH?
NO
YES
SET OBJECT LEVEL OF DISPLAY AREA SETTING AS CURRENT LEVEL
S108
CALCULATE SUM OF NUMBER OF DATA ITEMS BELONGING TO CURRENT LEVEL AND SUM OF NUMBER OF DATA ITEMS BELONGING TO CHILD LEVELS AND LEVELS LOWER THAN CHILD LEVELS BY ADDING UP NUMBER ON ASSUMPTION THAT NUMBER OF DATA WHOSE ACCESS FREQUENCY IS 0 IS 1.0 AND NUMBER OF DATA WHOSE ACCESS FREQUENCY IS LARGER THAN 0 IS (1.0 + ENLARGEMENT RATIO × ACCESS FREQUENCY)
S1009
DETERMINE AREA RATIO OF DATA ICON DISPLAY AREA TO CHILD LEVEL DISPLAY AREA ACCORDING TO SUM OF NUMBER OF DATA ITEMS BELONGING TO CURRENT LEVEL AND SUM OF NUMBER OF DATA ITEMS BELONGING TO CHILD LEVELS AND LEVELS LOWER THAN CHILD LEVELS
S109
DETERMINE DISPLAY AREA FOR EACH CHILD LEVEL SUBORDINATE TO CURRENT LEVEL ACCORDING TO SUM OF NUMBER OF DATA ITEMS BELOGING TO LEVELS LOWER THAN CHILD LEVEL
S110

FIG. 92

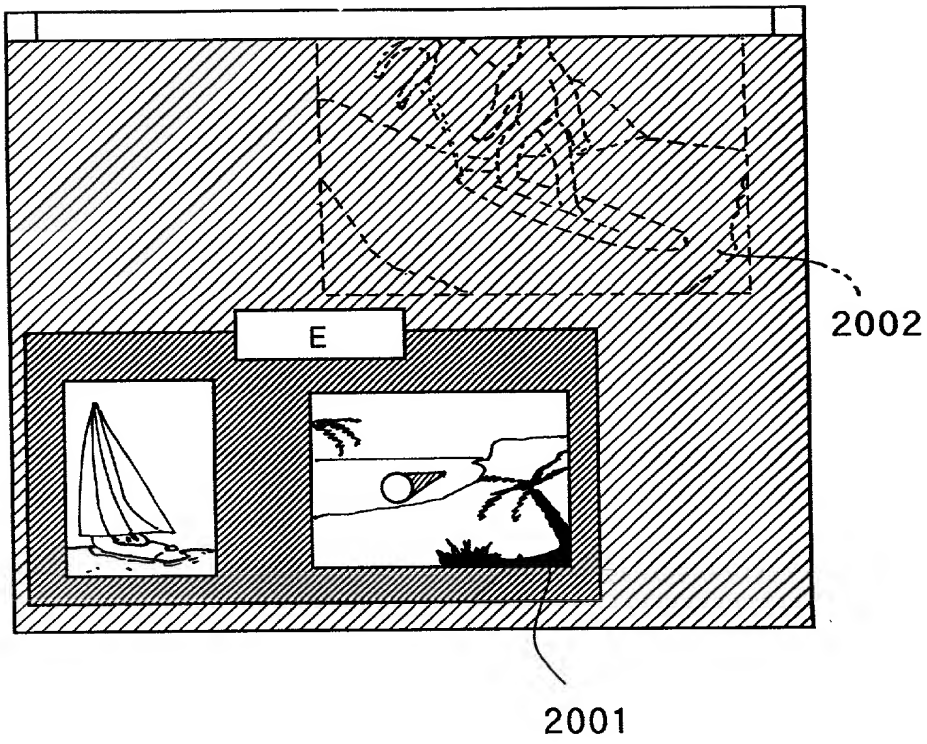


FIG. 93

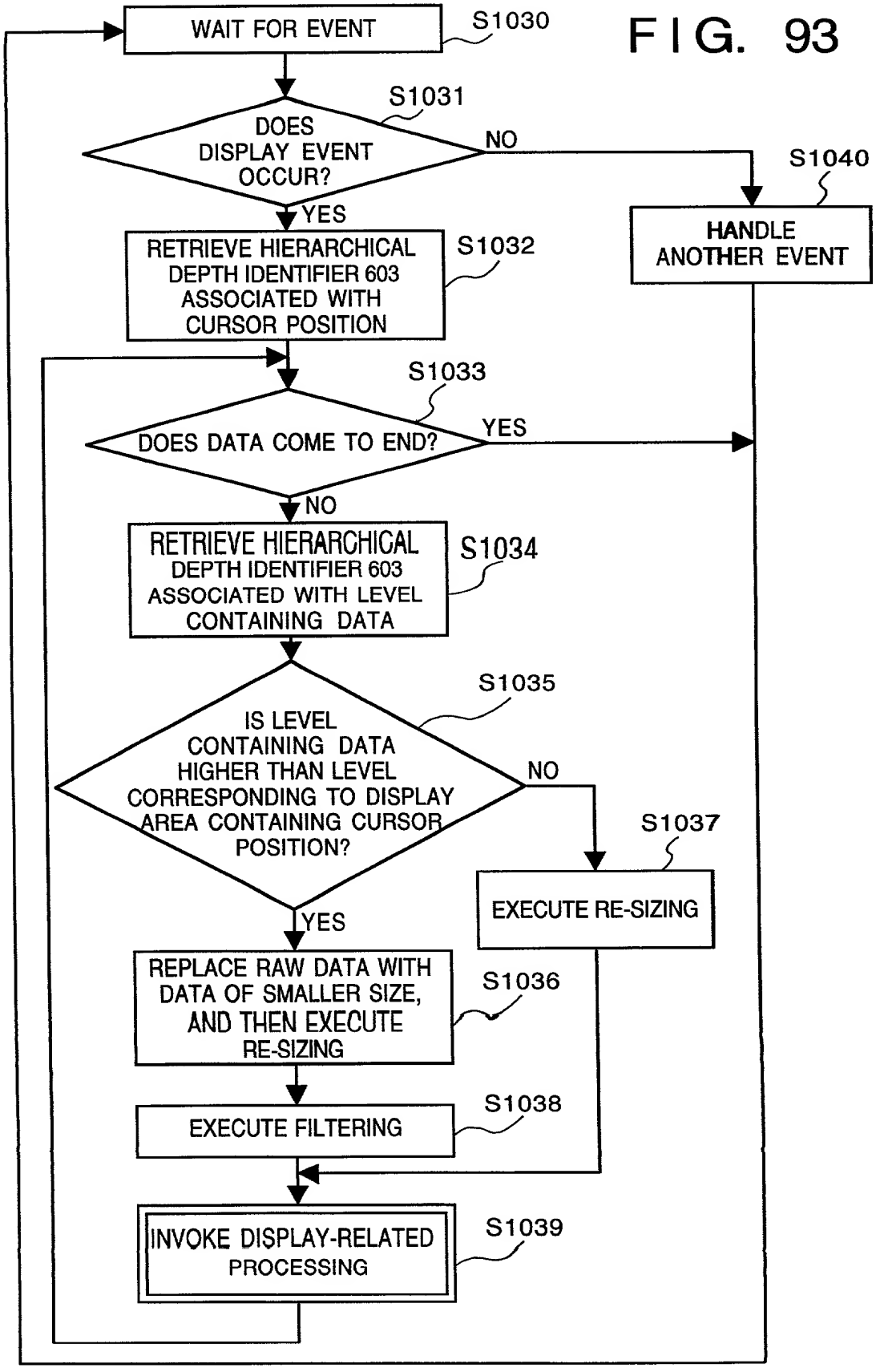

WAIT FOR EVENT
S1030
S1031
DOES DISPLAY EVENT OCCUR?
NO
S1040
HANDLE ANOTHER EVENT
YES
RETRIEVE HIERARCHICAL DEPTH IDENTIFIER 603 ASSOCIATED WITH CURSOR POSITION
S1032
S1033
DOES DATA COME TO END?
YES
NO
RETRIEVE HIERARCHICAL DEPTH IDENTIFIER 603 ASSOCIATED WITH LEVEL CONTAINING DATA
S1034
S1035
IS LEVEL CONTAINING DATA HIGHER THAN LEVEL CORRESPONDING TO DISPLAY AREA CONTAINING CURSOR POSITION?
NO
S1037
EXECUTE RE-SIZING
YES
REPLACE RAW DATA WITH DATA OF SMALLER SIZE, AND THEN EXECUTE RE-SIZING
S1036
EXECUTE FILTERING
S1038
INVOKE DISPLAY-RELATED PROCESSING
S1039

FIG. 94

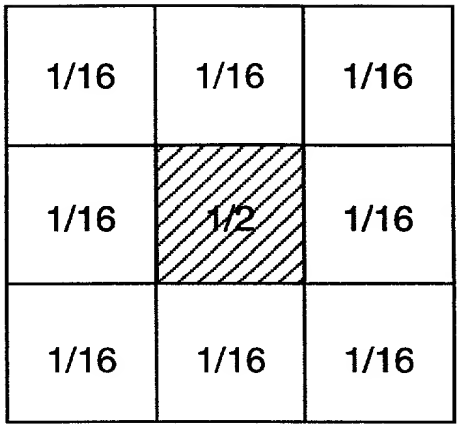


FIG. 95

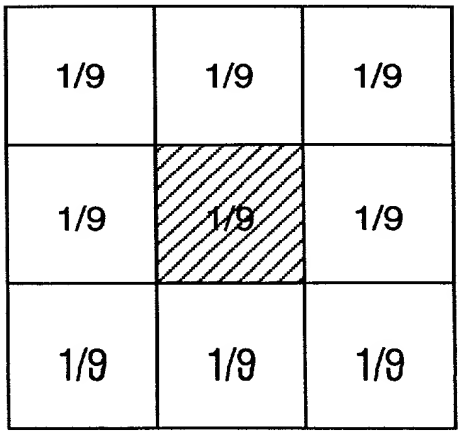


FIG. 96

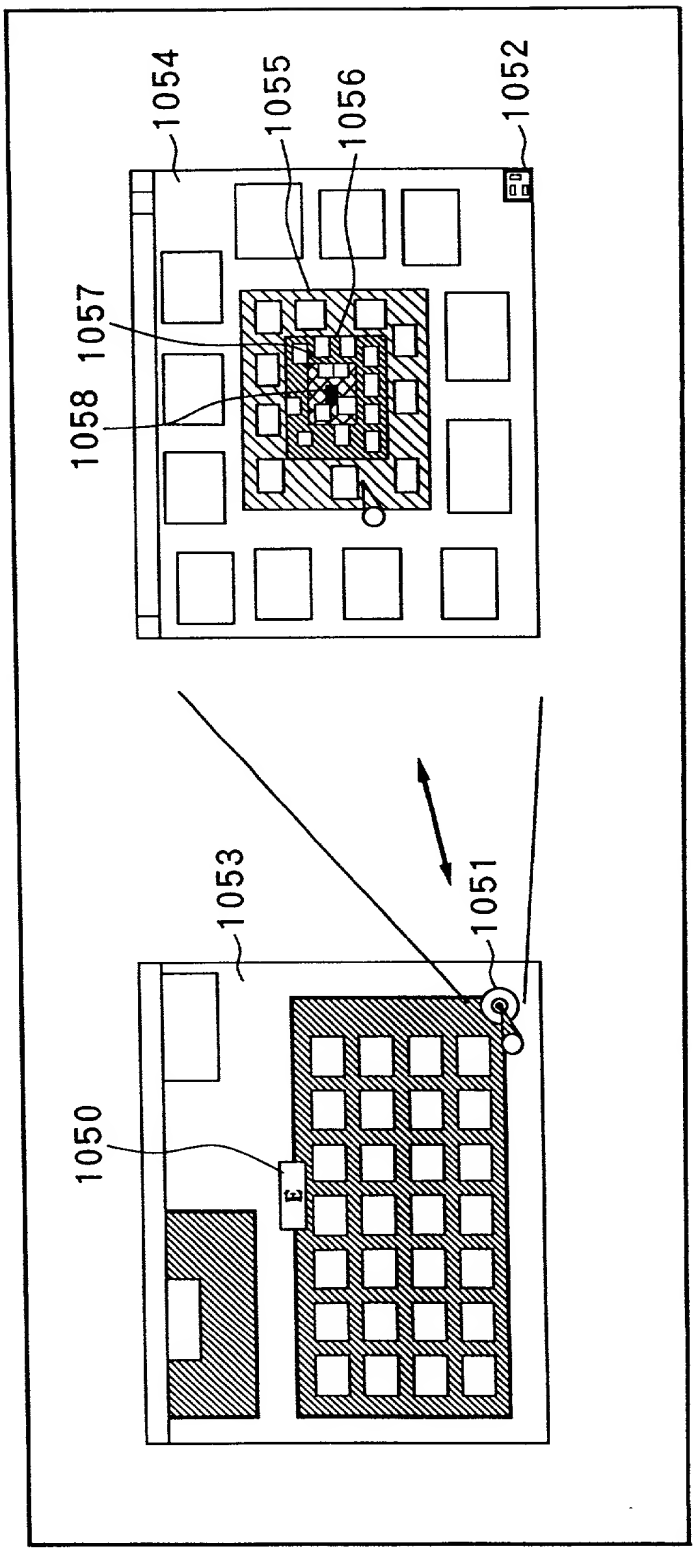


FIG. 97

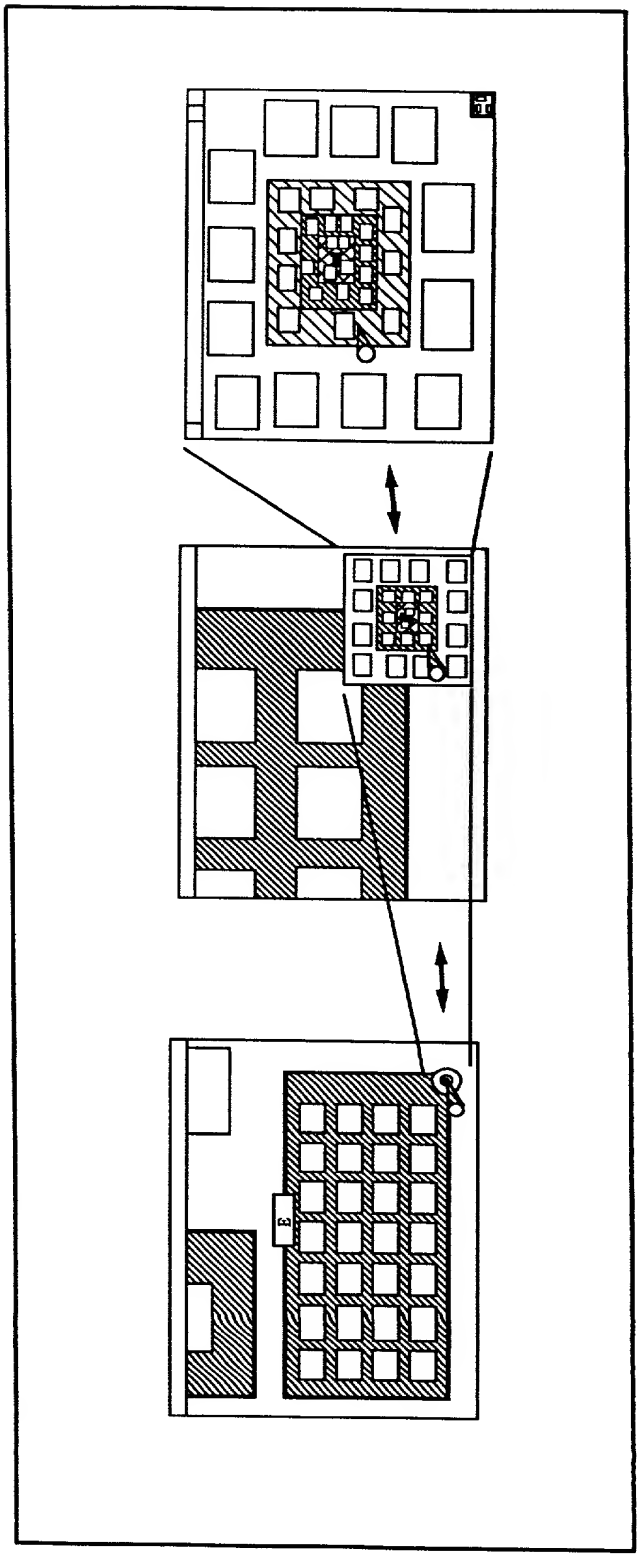
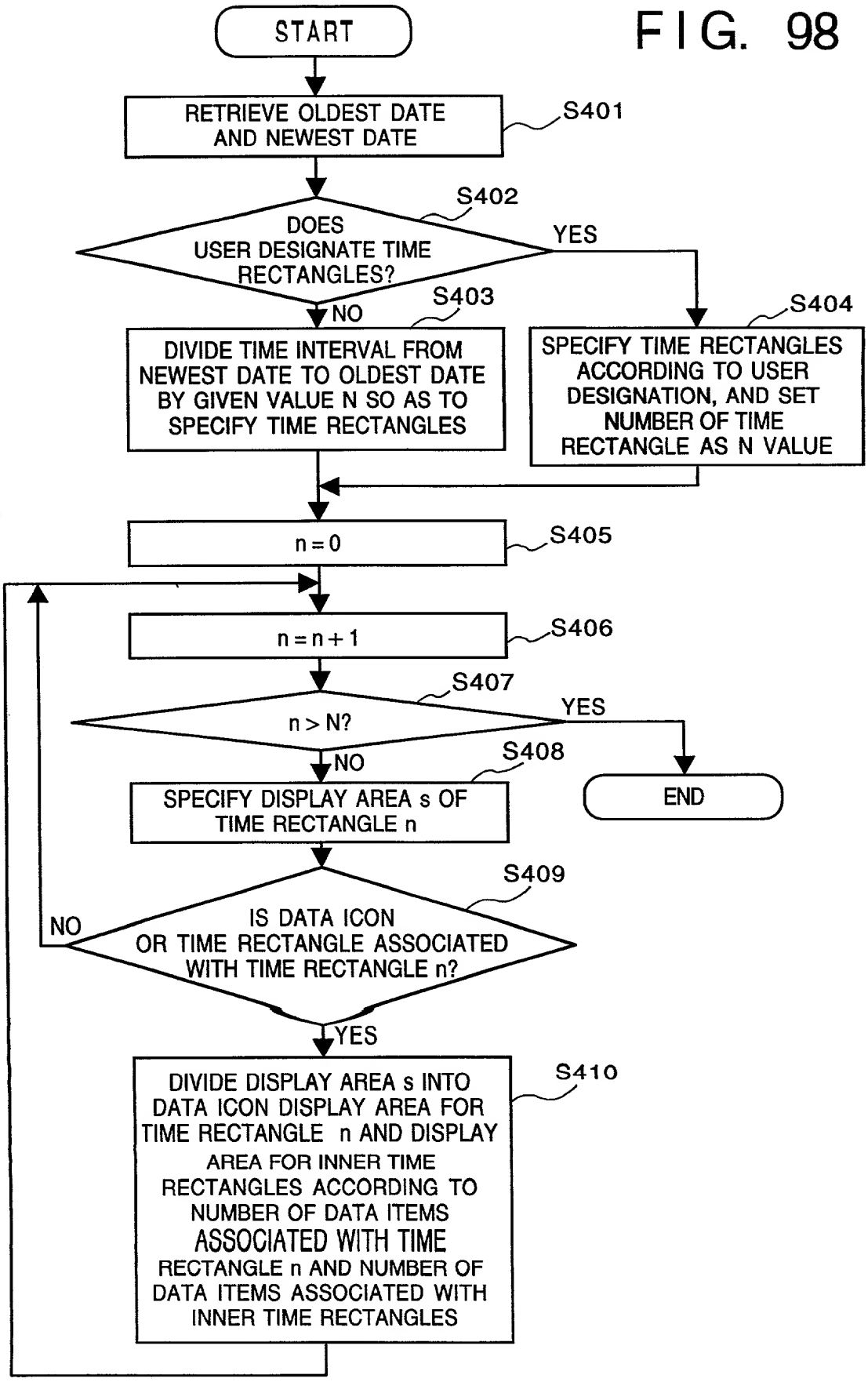


FIG. 98


START
RETRIEVE OLDEST DATE AND NEWEST DATE
S401
DOES USER DESIGNATE TIME RECTANGLES?
S402
YES
NO
S403
DIVIDE TIME INTERVAL FROM NEWEST DATE TO OLDEST DATE BY GIVEN VALUE N SO AS TO SPECIFY TIME RECTANGLES
S404
SPECIFY TIME RECTANGLES ACCORDING TO USER DESIGNATION, AND SET NUMBER OF TIME RECTANGLE AS N VALUE
n = 0
S405
n = n + 1
S406
n > N?
S407
YES
NO
END
S408
SPECIFY DISPLAY AREA s OF TIME RECTANGLE n
S409
IS DATA ICON OR TIME RECTANGLE ASSOCIATED WITH TIME RECTANGLE n?
NO
YES
S410
DIVIDE DISPLAY AREA s INTO DATA ICON DISPLAY AREA FOR TIME RECTANGLE n AND DISPLAY AREA FOR INNER TIME RECTANGLES ACCORDING TO NUMBER OF DATA ITEMS ASSOCIATED WITH TIME RECTANGLE n AND NUMBER OF DATA ITEMS ASSOCIATED WITH INNER TIME RECTANGLES

JP2000-035860

FIG. 99A

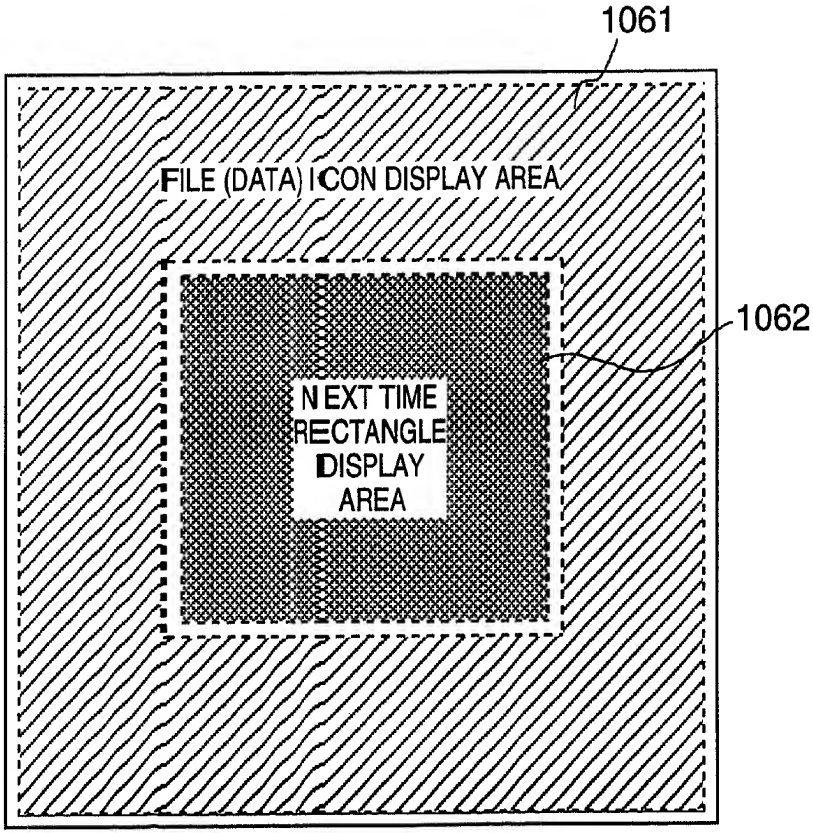


FIG. 99B

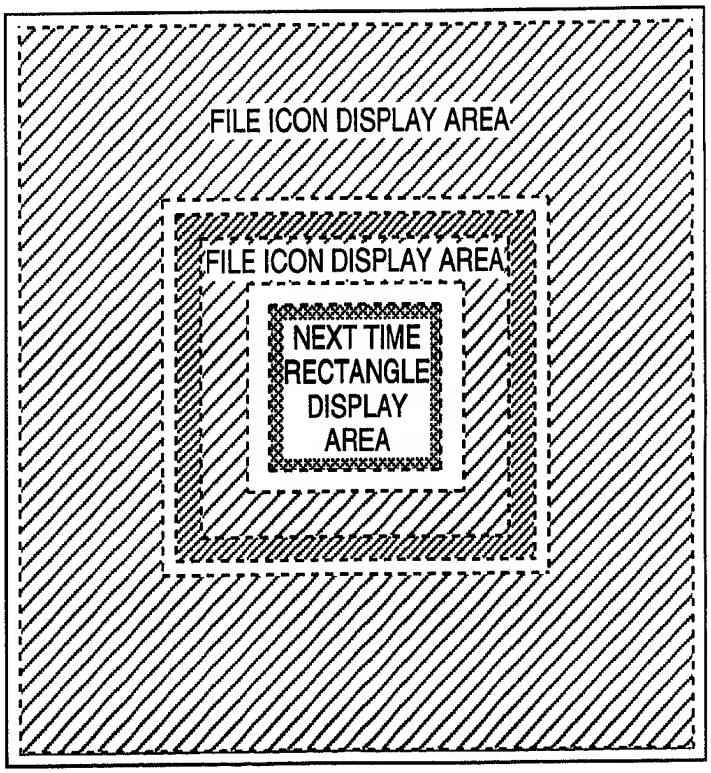


FIG. 100

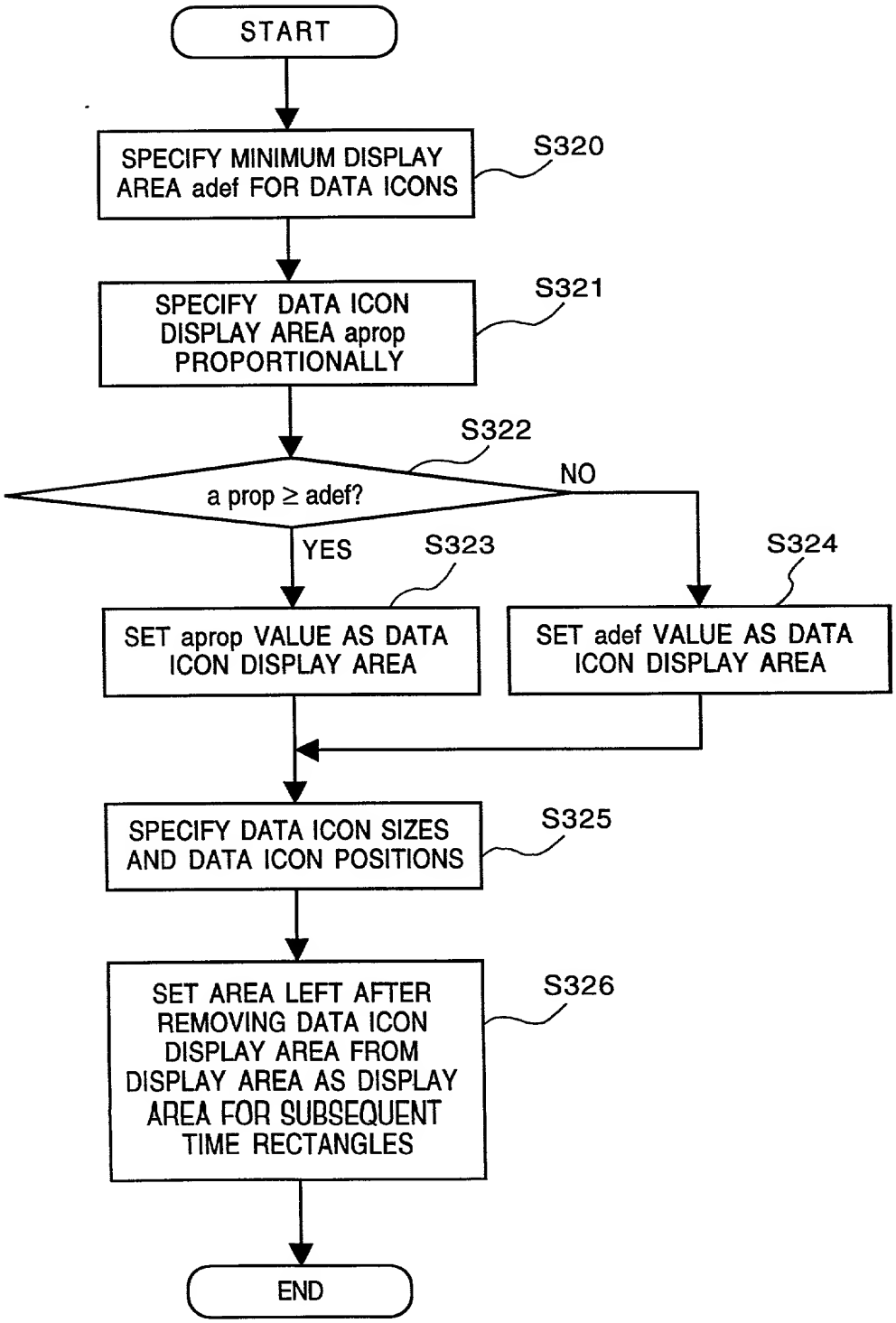

START
SPECIFY MINIMUM DISPLAY AREA adef FOR DATA ICONS
S320
SPECIFY DATA ICON DISPLAY AREA aprop PROPORTIONALLY
S321
S322
a prop ≥ adef?
NO
YES
S323
S324
SET aprop VALUE AS DATA ICON DISPLAY AREA
SET adef VALUE AS DATA ICON DISPLAY AREA
SPECIFY DATA ICON SIZES AND DATA ICON POSITIONS
S325
SET AREA LEFT AFTER REMOVING DATA ICON DISPLAY AREA FROM DISPLAY AREA AS DISPLAY AREA FOR SUBSEQUENT TIME RECTANGLES
S326
END

FIG. 101

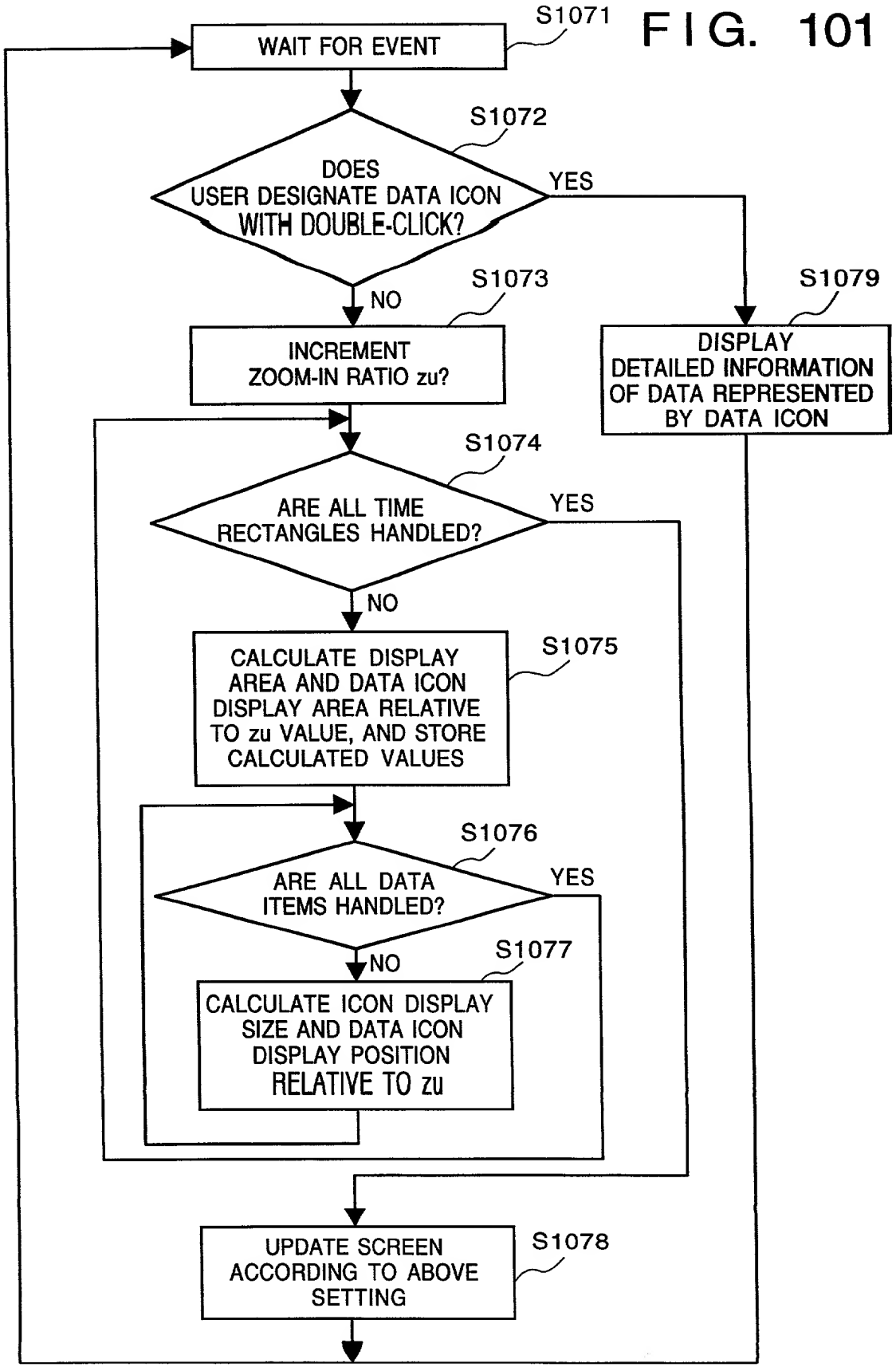

S1071
WAIT FOR EVENT
S1072
DOES USER DESIGNATE DATA ICON WITH DOUBLE-CLICK?
YES
NO
S1073
INCREMENT ZOOM-IN RATIO zu?
S1079
DISPLAY DETAILED INFORMATION OF DATA REPRESENTED BY DATA ICON
S1074
ARE ALL TIME RECTANGLES HANDLED?
YES
NO
S1075
CALCULATE DISPLAY AREA AND DATA ICON DISPLAY AREA RELATIVE TO zu VALUE, AND STORE CALCULATED VALUES
S1076
ARE ALL DATA ITEMS HANDLED?
YES
NO
S1077
CALCULATE ICON DISPLAY SIZE AND DATA ICON DISPLAY POSITION RELATIVE TO zu
S1078
UPDATE SCREEN ACCORDING TO ABOVE SETTING

FIG. 102

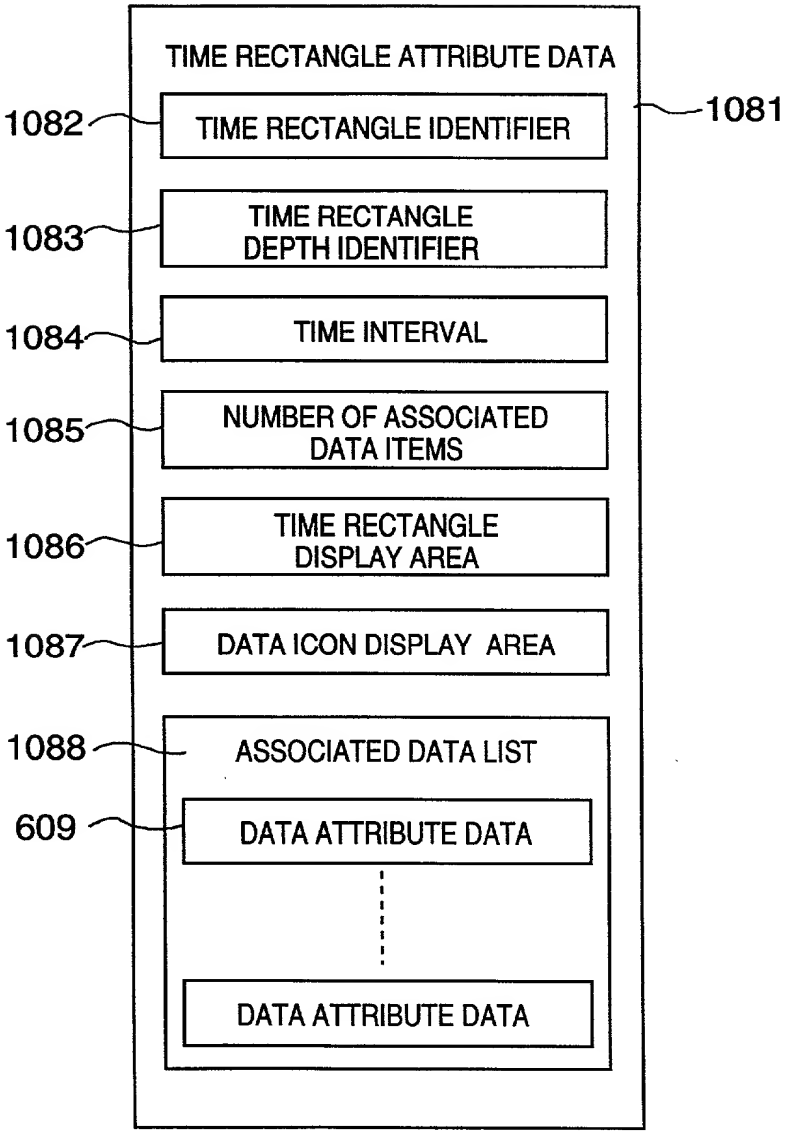
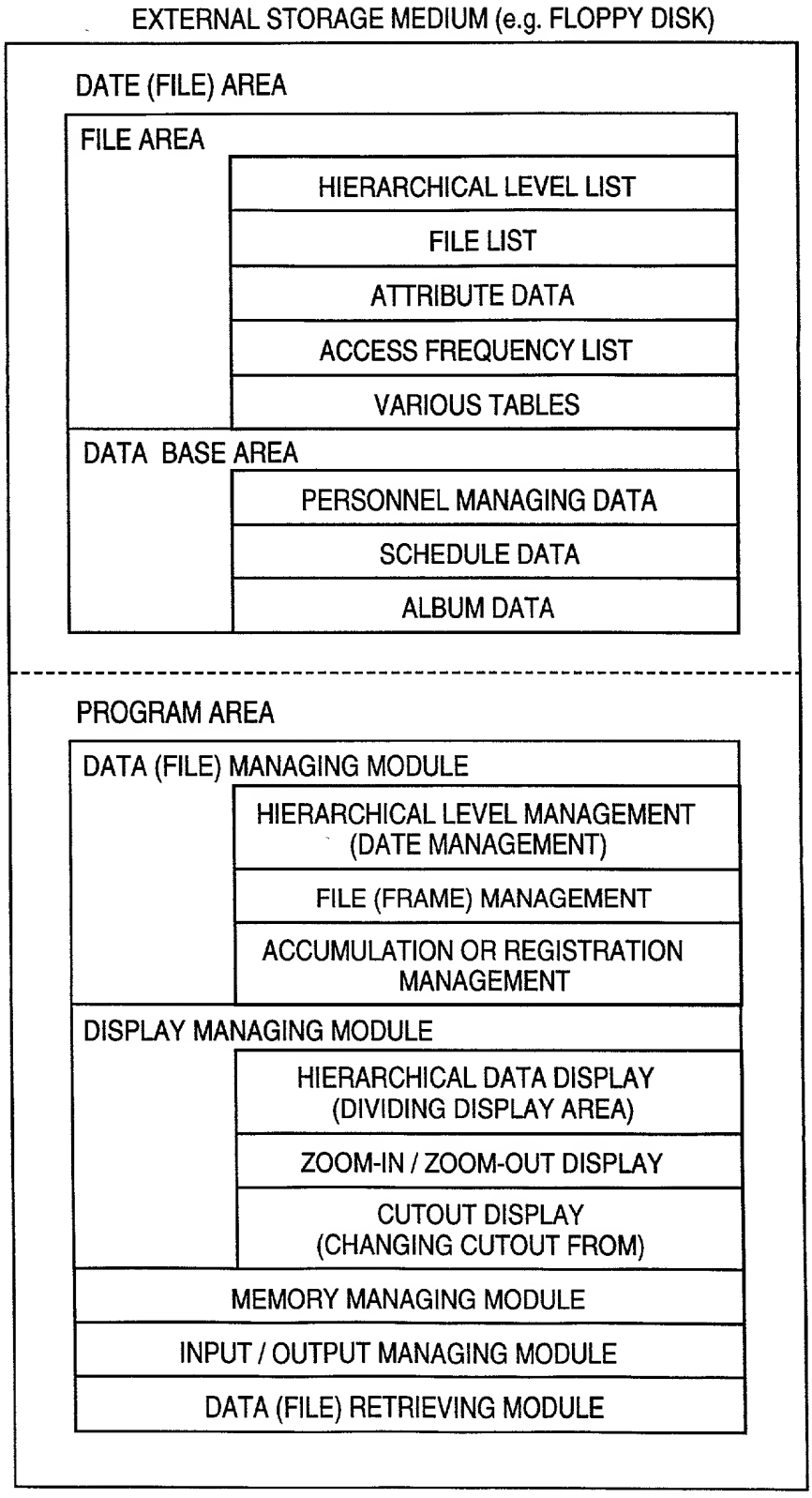

TIME RECTANGLE ATTRIBUTE DATA
1081
1082
TIME RECTANGLE IDENTIFIER
1083
TIME RECTANGLE DEPTH IDENTIFIER
1084
TIME INTERVAL
1085
NUMBER OF ASSOCIATED DATA ITEMS
1086
TIME RECTANGLE DISPLAY AREA
1087
DATA ICON DISPLAY AREA
1088
ASSOCIATED DATA LIST
609
DATA ATTRIBUTE DATA
DATA ATTRIBUTE DATA

FIG. 103


EXTERNAL STORAGE MEDIUM (e.g. FLOPPY DISK)
DATE (FILE) AREA
FILE AREA
HIERARCHICAL LEVEL LIST
FILE LIST
ATTRIBUTE DATA
ACCESS FREQUENCY LIST
VARIOUS TABLES
DATA BASE AREA
PERSONNEL MANAGING DATA
SCHEDULE DATA
ALBUM DATA
PROGRAM AREA
DATA (FILE) MANAGING MODULE
HIERARCHICAL LEVEL MANAGEMENT (DATE MANAGEMENT)
FILE (FRAME) MANAGEMENT
ACCUMULATION OR REGISTRATION MANAGEMENT
DISPLAY MANAGING MODULE
HIERARCHICAL DATA DISPLAY (DIVIDING DISPLAY AREA)
ZOOM-IN / ZOOM-OUT DISPLAY
CUTOUT DISPLAY (CHANGING CUTOUT FROM)
MEMORY MANAGING MODULE
INPUT / OUTPUT MANAGING MODULE
DATA (FILE) RETRIEVING MODULE